

**Relations among official, enacted and assessed
dimensions of the Mathematics curriculum in a public
adult learning centre in KwaZulu-Natal**

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Prof Peter Rule

DECLARATION

Submitted in fulfilment of the requirements for the degree of Master of Education, in
the Graduate Programme in Adult Education

University of Kwa-Zulu Natal, Pietermaritzburg, South Africa.

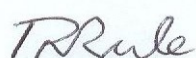
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My thanks also go to my supervisor, Prof Peter Rule, for his invaluable and expert guidance.

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Lastly, I would like to thank the KZN Language Institute for assistance with editing and formatting this document.

DEDICATION

This thesis is dedicated to my late mother, who consistently instilled in all her children the importance of an education and the independence one gains from it.

ABSTRACT

The purpose of this enquiry was to investigate relations among official, enacted and assessed dimensions of the Mathematics curriculum in a Public Adult Learning Centre. The research focused on teaching and learning at ABET Level 4 Mathematical Sciences and Mathematical Literacy. The research site was a Public Adult Learning Centre in Pinetown, KwaZulu-Natal. This site was purposively selected for its achievement of relatively good results over a number of years in the General Education and Training Certificate and has a good reputation among stakeholders such as the provincial Department of Education. This qualitative study was conducted within an interpretive paradigm, using a case study approach. Data were collected through interviews, observations, focus group discussions and document analysis, and analysed using thematic content analysis. The study found that teachers taught and assessed according to the official curriculum, but that the assessed curriculum had a strong washback effect on the enacted curriculum. The enacted curriculum also did not have strong relevance to learners lived experiences.

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ACRONYMS AND ABBREVIATIONS

ABE	ADULT BASIC EDUCATION
ABET	ADULT BASIC EDUCATION AND TRAINING
DHET	DEPARTMENT OF HIGHER EDUCATION AND TRAINING
FET	FURTHER EDUCATION AND TRAINING
GETC	GENERAL EDUCATION AND TRAINING CERTIFICATE
ICT	INFORMATION AND COMMUNICATION TECHNOLOGY
KZN	KWAZULU-NATAL
ML	MATHEMATICAL LITERACY
MMS	MATHEMATICS AND MATHEMATICAL SCIENCES
NQF	NATIONAL QUALIFICATIONS FRAMEWORK
PALC	PUBLIC ADULT LEARNING CENTRE
RDP	RECONSTRUCTON AND DEVELOPMENT PROGRAMME
SAQA	SOUTH AFRICAN QUALIFICATIONS AUTHORITY
SBA	SITE BASED ASSESSMENT TASKS
UKZN	UNIVERSITY OF KWAZULU-NATAL
US	UNIT STANDARD

1. CHAPTER ONE: INTRODUCTION TO THE STUDY

1.1 Introduction

This case study investigates the Mathematics curriculum at a public adult learning centre in the eThekweni Municipality. It focuses on the curriculum at Adult Basic Education and Training (ABET) Level 4, at the end of which learners write external examinations for the General Education and Training Certificate (GETC), which is an exit point in the adult education field of ABET. In particular, the study focuses on three dimensions of the Mathematics curriculum – the official, enacted and assessed curriculum – and the relationship amongst these dimensions.

This introductory chapter outlines the purpose of this study, describes the rationale of the study and provides a background on Adult Basic Education and Training (ABET) curriculum provisioning in South Africa in order to contextualise the study. It provides a general overview of the format of the study. The background in this chapter illustrates the time line of the policies and legislation that guide planners and other stakeholders involved in ABET provisioning. The key terms official, enacted and assessed curriculum are briefly discussed. The experienced curriculum is an aspect of the enacted curriculum. The main research question, ‘What are the relationships amongst the official, enacted and assessed aspects of the Mathematics curriculum at the centre?’ is discussed against this background. The study acknowledges the curriculum trajectory as it unfolds from its stage of inception at the level of policy makers to the written document, to school districts, to teachers of ABET and their learners in the classroom and finally to its internal and external assessment.

The study investigates the possibility, arising from other studies, that there might be a “gap” between what is prescribed and what actually occurs (Hoadley & Jansen, 2009, p.43). Do teachers of ABET teach according to what is prescribed in policy documents? Policy sociology indicates that policy and curriculum implementation do not “follow the predictable path of formulation, i.e. adoption – implementation – reformulation, but are re-contextualised through multiple processes” (Ball, as cited in Chisholm & Leyendecker, 2008, p. 196).

1.2 Terminology

At the time of this study, the learning centres were referred to as Public Adult Learning Centres (PALCs). The terminology has changed since, and centres are now called Community and Education Training Centres. In this study, I use the term ABET because ABET includes the basic education of adults. Adult Education and Training (AET) refers to

all levels of adult education, including tertiary up to post graduate level. I refer to the centre which I investigated, as 'the ABET centre' or simply 'the centre'. The General Education and Training Certificate (GETC) is now referred to as the General Education and Training Certificate for Adults (GETCA), (DHET, 2013).

1.3 Purpose of the study

This study was a part of a multi-case study that focused on the institutional efficacy of selected, exemplary adult learning centres in four provinces: KwaZulu-Natal, Limpopo, Gauteng and the Western Cape. Institutional efficacy is understood here as the capacity of adult education centres to achieve the desired results. The multi-case study looked at "good centres" as judged according to three criteria: their performance in the General Education and Training Certificate examinations over the last three years; their recruitment, retention and throughput of learners; and their reputation among stakeholders. It aimed to discover what new elements should be included in any new/existing adult centres. The centres were purposively selected, with some recommended by the Department of Education (DoE) as official sites, and the examination results from Umalusi, the quality assurance council for general and further education and training in South Africa, provided an additional basis for selection. The main study sought to establish the factors that contributed to the effective and efficient functioning of adult education centres in relation to three domains: governance; teaching and learning; and wider community and institutional relations.

This study was embedded in the second domain: teaching and learning. Its purpose was to investigate the relations in the three spheres of curriculum: official, experienced/enacted and assessed curricula in the ABET Level 4 Mathematics curriculum.

1.4 Rationale

My motivation for this study focused on three points, namely: the importance of the issue given the context; the gap in the literature; and my interest as researcher.

Past research studies have indicated that ABET initiatives in South Africa have been fraught with numerous challenges such as a lack of funding, poor implementation of programmes and the use of unqualified personnel, to name just a few (Moyo, 2014, p. 113). In the context of a number of new developments in the adult education field, it will be of value to find out what works regarding curriculum implementation as a contribution to developing the new community colleges and their curricula.

Secondly, a desktop study revealed that there is a dearth of information and a gap in the literature that is available on Public Adult Learning Centres (Community and Education

Training Centres as they are now called) in South Africa. Little is known about how curriculum actually works in these centres. Hence, the study will provide insight into this field of education.

Thirdly, my interest in what and how adult learners are taught in ABET classes was aroused after observing learners in ABET classes in the UGU District Municipality in KwaZulu-Natal over a period of time. I observed adult learners being taught like young children. I further observed adults responding likewise when being taught in this manner. I am thus personally interested in how best to enact a curriculum with adult learners. My interest in Mathematics in particular arises from being an educator who has taught across the spectrum, from foundation phase to adult education.

This research study, as part of the wider study with its focus on investigating efficacy in teaching and learning at Public Adult Learning Centres, is relevant in the context of South Africa because it will potentially be of value to policy makers and planners of Adult Community Colleges and Public Adult Learning Centres.

1.5 Background

1.5.1 ABET policy and legislation

The apartheid era had dire and lasting consequences for our education system. The context of apartheid deliberately perverted the education of the black majority of South Africans. This context shaped what happened after 1994. Apartheid education had, and continues to have, a devastating effect on our education system, including the education of adults. Specifically, in relation to Mathematics, South Africa's overall proficiencies and results are very poor as a consequence of this history and our (so far unsuccessful) struggle to overcome it.

The period 1994 – 2011 introduced a new historical era for education in South Africa. Outcomes-based education (OBE) was introduced, as a means to move away from apartheid education. Its fundamental aim was to address skills, knowledge and values (Mouton, Louw & Strydom, 2012, p. 1211). This facilitated the introduction of international benchmarking tests, for example, the implementation of the Third International Mathematics and Science Study (TIMSS) was implemented to test the competency of learners in Mathematics. Sadly, in comparison to other participating countries, the outcome for South African learners was dismal and extremely poor (Mouton et. al., 2012).

A number of policies and legislative frameworks that support Adult Basic Education and Training (ABET) were promulgated by the South African government after 1994. One of the

objectives of the legislative framework was to support ABET's role in social change and development. Literacy and basic education were regarded as critical to addressing the basic needs and developmental imperatives in respect of the majority of South Africa's poor. For this reason, literacy and other forms of basic education were central to government's proposals for human resource development for those who had little or no basic schooling (African National Congress as cited in McKay, 2012).

1.5.2 Policy documents and legislation on Adult Basic Education and Training

The formulation of policy in ABET is shaped by three policy frameworks that are current: The National Policy Act No. 27 of 1996, the 1995 White Paper on Education, and the South African Authority Act No. 58 of 1995. In addition, the Policy Document on Adult Basic Education and Training Act 52 of 2000, (DHET, 2009) informs us of a broad national curriculum framework which seeks to support curriculum development. The framework serves as a reference point for the development of education and training programmes that will improve the quality and extent of ABET provision.

Subsequent to the Policy Document on Adult Basic Education and Training Act 52 of 2000, the White Paper for Post-School Education and Training (DHET, 2013) acknowledged the difficulties facing effective teaching and learning in adult centres, including Public Adult Learning Centres. The ABET Act 52 of 2000 was amended in the Further Education and Training College Amendment Act, 2012. The Department of Higher Education and Training (DHET) initiated a process of curriculum development for adult learners, including curricula for the matriculation-level National Senior Certificate for Adults (DHET, 2013) and the General Education and Training Certificate for Adults (DHET, 2013).

These and numerous other acts and legislation that govern ABET provisioning are presented in Figure 1.

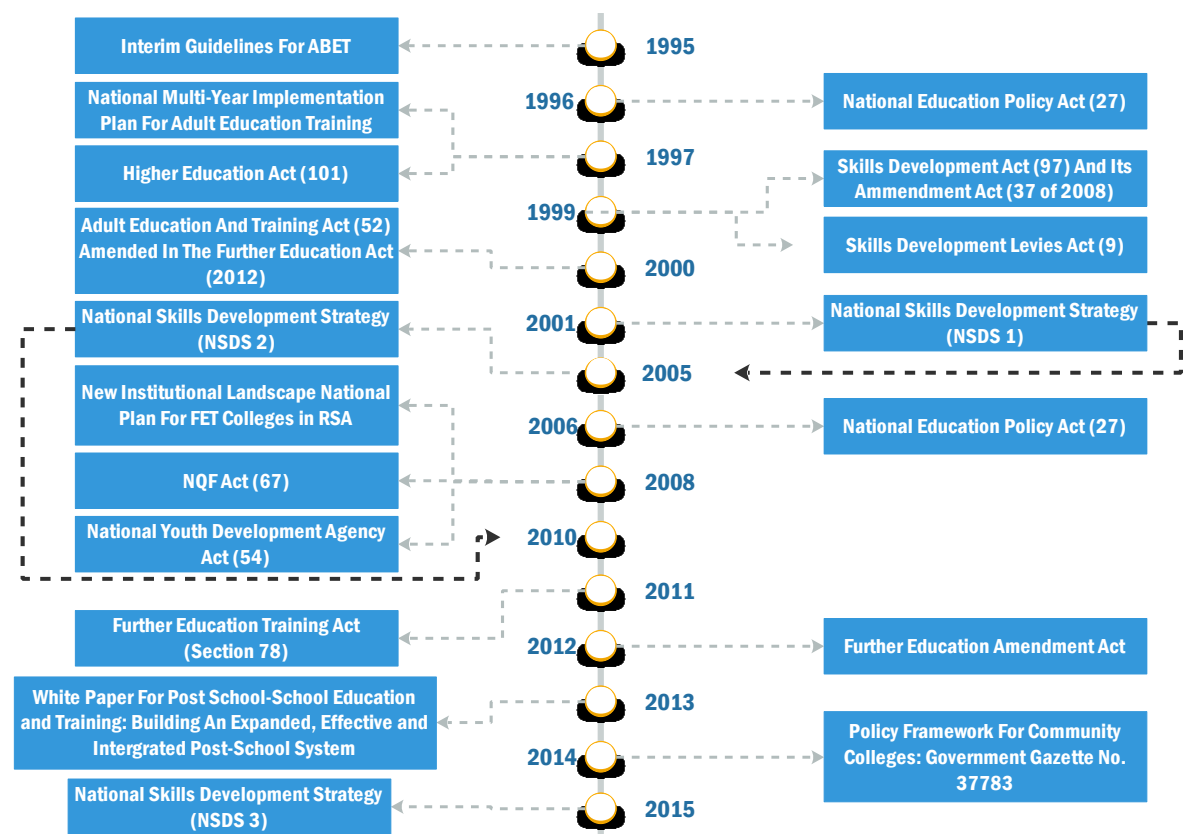


Figure 1. A Timeline of ABET Policies and Acts

Adapted from *Reconfiguring the post-schooling sector: a critical review of adult basic education and training (ABET) provision in South Africa* (p. 4), by V. McKay, 2012, Labour Market Intelligence Partnership, Working Paper 18, Pretoria: University of South Africa.

With these Acts, Government was endeavouring to “put right the wrongs” of the previous dispensation and its view on adult education. Post-apartheid adult education and training (AET) aimed to provide “lifelong opportunities to the employed, unemployed, young and old, the disabled, rural women, out of school youth, adults in workplaces and prisoners”, (DHET, 2014, p. 56).

A brief synopsis of the pertinent ABET acts and policies follows (refer to Figure 1):

The 1995 Interim Guidelines for ABET Education asserted that policy must reflect its primary responsibility to all adult learners in South Africa.

The 1996 National Education Policy Act 27 of 1996 referred specifically to protecting the right to basic education. The Act observed that as a result of the high attrition rate in schools, millions of South Africans were functionally illiterate (McKay, 2012, p. 5).

The 1997 National Multi-Year Implementation Plan for Adult Education and Training (Department of Education, 1997) stressed the need to target out-of-school youth as well as

other categories of learners, such as the disabled, women and prisoners (McKay, 2012, p. 10).

Meyer & Botha (2004) view the National Skills Development Act 97 of 1998, “the Skills Levy Act,” as:

significant in empowering lower level employees through education and training... the act encourages partnerships between the public and private sectors of the economy for the provision of workplace education and training (Meyer et al., 2004, p.12)

The above policies and legislation on Adult Education and Training are a crucial component of the reconstruction, development and transformation of South African society. With globalisation and South Africa being a part of the global village, it has become necessary that all individuals receive a sound education in order to participate effectively in a “complex social and economic environment” both “locally and internationally” (DHET, 2014, p.3). Globalization is transforming the world of finance, currency, trade, employment and social systems. Against this global backdrop, adult education is important for social change. It addresses socio-economic challenges through human resource development (Baloyi, 2014, p. 1).

ABET has a vital role to play in civil society which goes beyond “skilling” those with low literacy levels. It is intended to serve a wider target population, acting as a change agent for social and economic development that will have an impact on restoring or bringing back the dignity and self-esteem of the learner (Baloyi, 2014, p. 1).

The concept of adult basic education and training as used in the policies focused on the growth and development of learners as holistic beings. ABET was intended to equip its marginalised citizens by developing them both socially and economically. It was to be the conduit for the facilitation of opportunities and for adults to participate confidently in the social aspects of life. It was also to provide access to learning, and articulation with other institutions aimed at redressing historical imbalances for both personal and socio-economic development. Lastly, ABET was regarded as a cornerstone for justice and equality and towards contributing core values adopted for South Africa (McKay, 2012, p. 5).

McKay (2012) claims that, according to The Bill of Rights, (see Section 29 of the Bill of Rights in the Constitution of the Republic of South Africa 1996), the ABET mandate was expected to:

provide people with the basic foundation to learning and equip them with the skills and critical capacity to participate fully in society. It was to meet the needs of women (in particular rural inhabitants), out-of-school youth, the unemployed, prisoners and adults with disabilities. The provision of basic education was constitutionally enshrined as a basic right of all citizens and a legal entitlement to which every person has a claim (McKay, 2012, p. 5).

Regrettably, the system has continued to produce inequalities with regards to educational opportunities in the adult education sector, and “access and success in the Adult Education and Training qualification is low and its quality is in doubt” (DHET, 2013, p. 32). Adults and youth who are not in formal workplaces or educational institutions have fewer opportunities to access first or second opportunities of learning. These groups, according to Baatjes (DHET, cited in McKay, 2012, p. 2), include about 12 million adults with less than Grade 9 education. Of these, almost three million are young people between the ages of 18 and 24 years who are neither in education nor in employment or training (NEETs), and who are in need of education and training opportunities.

These findings were convincing evidence of the urgency of addressing the challenges confronting the ABET sector. Similarly, the White Paper for Post-School Education and Training (DHET, 2013) posited that the current Adult Education and Training qualification had not been able to contribute meaningfully and significantly to realising the right to Adult Basic Education. The White Paper for Post-School Education and Training (DHET, 2013) identified the key challenges that South African higher education and training was faced with. In addition, it articulated the weaknesses associated with AET provisioning.

It postulated that the AET qualification failed to make a meaningful contribution in this sector. The issue of articulation in the various institutions impacted on addressing the needs of this target group. For example, the AET qualification, which is on National Qualifications Framework (NQF) Level 1, does not articulate with a university qualification. The DHET (2013, p. 3) regards articulation as an important measure of success and envisages to create a “single, coherent and integrated system of post-school education and training”. In addition, the AET programme offerings were limited. There were insufficient second chance opportunities for learners, and minimal support for non-formal education. The AET provision focused more on formal qualifications, which were not necessarily what the learners wanted (refer to Table 1 for the learning areas offered). Another concern was the quality of the GETC qualification offered and the few adults that acquired the full qualification. Most collected a “few certificates in learning areas” (DHET, 2014, pp. 3 – 4).

In response to these challenges, a “workable training institutional model for community education and training” was conceptualised (DHET, 2014). This model was to provide

...a diversity of programmes, articulation with qualifications of existing institutions, and provisioning should be community oriented to ensure lifelong learning opportunities. These institutions will be known as community colleges. (DHET, 2014, p. 4).

The principles underpinning the establishment of community colleges were to be:

...partnerships, employer and work organisation involvement; local community developmental agenda determination; inter-departmental cooperation; agency for the State’s developmental agenda and robust research, monitoring and evaluation. (DHET, 2014, p. 6).

The introduction of community colleges would take:

a phased approach, and... be preceded by a pilot process to help inform further development of the concept and its roll-out throughout the country”

Community colleges would add to the current programmes in the Public Adult Learning Centres:

Qualifications and part-qualifications shall be offered under the auspices of the Department of Higher Education and Training. Formal programmes will include the General Education and Training Certificate (GETC) and Senior Certificate programmes currently on offer, as well as the proposed new National Senior Certificate for Adults (NASCA) (DHET, 2014, p. 11).

1.6 GETC ABET Level 4 qualification

The GETC ABET Level 4 is one of the formal qualifications offered at the PALCs. The Mathematics curriculum in the GETC ABET Level 4 qualification is the focus of this study. Mathematics is a compulsory learning area in the GETC qualification (refer to Table 1) and is offered in two streams, namely Mathematics and mathematical sciences (MMS) and mathematical literacy (ML). The ABET GETC Qualification comprises of the following learning areas:

Table 1. Learning Areas in GETC Qualification

RULES OF COMBINATION FOR THE GETC-ABET QUALIFICATION: 120 CREDITS		
FUNDAMENTALS COMPONENT: COMPULSORY		39 CREDITS
1.	One Official Language: 23 Credits	
2.	Mathematical Literacy: 16 Credits OR	
3.	Mathematics and Mathematical Sciences: 16 Credits NOT BOTH	
CORE COMPONENT: COMPULSORY		32 CREDITS
1.	Life Orientation: 32 Credits	
ELECTIVES COMPONENT: OPTIONAL		51 CREDITS
Academic Learning Areas:		
1.	Human and Social Sciences: 23 Credits	
2.	Natural Sciences: 15 Credits	
3.	Economic and Management Sciences: 21 Credits	
4.	Arts and Culture: 17 Credits	
5.	Technology: 11 Credits	
6.	One Additional Official Language (Excluding the language chosen as a Fundamental): 23 Credits	
Vocational Learning Areas:		
7.	Applied Agriculture and Agricultural Technology: 20 Credits	
8.	Ancillary Health Care: 45 Credits	
9.	Small, Medium and Micro Enterprises: 17 Credits	
10.	Travel and Tourism: 38 Credits	
11.	Information Communication Technology: 23 Credits	
12.	Early Childhood Development: 26 Credits	
13.	Wholesale and Retail: 37 Credits	
OPTION 1 (5 Learning Areas)		OPTION 2 (6 Learning Areas)
TWO Fundamentals ONE Core Two Electives		TWO Fundamentals ONE Core and THREE Electives
		OPTION 3 (7 or more learning areas)
		TWO Fundamentals ONE Core and FOUR Electives

Note. Reprinted from SAQA, 71751. Retrieved February 21, 2014 from <http://regqs.saqa.org.za/showQualification.php?id=71751>

1.6.1 Purpose and rationale of the GETC ABET Level 4 qualification

The General Education and Training Certificate (GETC) in Adult Basic Education and Training (ABET) is appropriate for adult learners as it provides them with the fundamental basics of general education:

Its purpose is to equip learners with foundational learning so that they may acquire knowledge, skills and values. Learners may choose Electives which relate to occupational type learning relevant to their area of interest or specialisation (SAQA, 2014, p. 1).

The specific purpose of the qualification is detailed in Table 2:

Table 2. Purpose of the Qualification

Develop and apply relevant skills, knowledge and attitudes in the chosen Learning Areas.
Function better in and contribute to the world of work.
Be sensitive and reflective of issues relating to diversity, inclusivity, cultural values, human rights, gender, development and change.
Develop an appreciation for lifelong learning.
Function better as a citizen in South Africa and contribute to cultural, social, environmental and economic development.
Make informed judgements about critical ethical issues.
Develop study skills to be able to access further learning
(SAQA, 2014, p. 1).

Note. Reprinted from SAQA. 71751. Retrieved February 21, 2014 from <http://regqs.saqa.org.za/showQualification.php?id=71751>

The GETC ABET qualification (SAQA ID 71751) is registered at Level 1 on the National Qualifications Framework (NQF). NQF level 1 is equivalent to Grade 9 at school level (SAQA, 2014).

1.6.2 Equivalence of ABET levels to school grades

There are four levels within ABET, shown in Table 3 below. Learners without any schooling are placed on Level 1.

Table 3. ABET levels in the NQF

NQF training band	School grades	ABET levels
General Education and Training (GET)	Senior Phase (Grades 7–9)	ABET Level 4
	Intermediate Phase (Grades 4–6)	ABET Level 3
	Foundation Phase (Grades 2–3)	ABET Level 2
	Foundation Phase (Grades R–1)	ABET Level 1

Note: Adapted from *Organisational development and transformation in South Africa* (p. 14), by Meyer, M., & Botha, E. (2014), South Africa: Lexis Nexis.

The articulation of the ABET Level 4 qualification to other qualifications is shown in Figure 2:

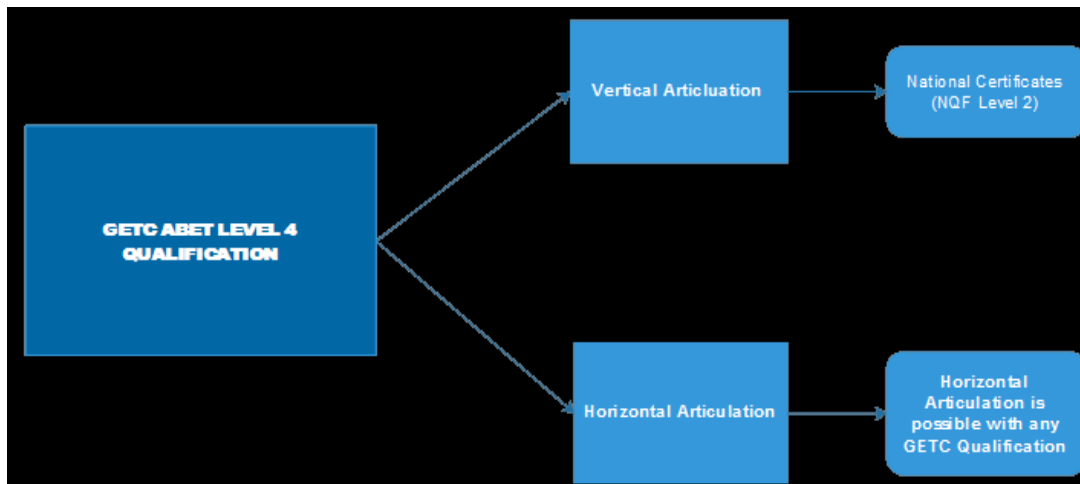


Figure 2. Articulation to Other Qualifications

Adapted from SAQA. 71751. Retrieved February 21, 2014 from <http://regqs.saqa.org.za/showQualification.php?id=71751>

This qualification does not give learners access into higher education (university). Learners who wish to pursue studies in higher education are required to study further (refer to Figure 2 on articulation).

1.6.3 Articulation options for learners after achieving the GETC: ABET qualification

The purpose and rationale, rules and prior learning assumed to be in place and the articulation options for this qualification are listed in the SAQA unit standard 71751. A learner may choose a vocational route through completion of the National Certificate: Vocational Qualifications at Levels 2, 3 and 4, which contain vocational specializations; OR access to academic learning at NQF Level 2 and above; OR access to an Occupational specific qualification at NQF Level 2, which consists of knowledge, skills and workplace experience and learning (SAQA, 2014).

1.7 Curriculum policy

From 2012 the two National Curriculum Statements, for Grades R-9 and Grades 10-12 respectively, were combined. The policy is now referred to as the National Curriculum Statement Grades R–12. It prescribes the policy statement for teaching and learning in South African schools. It comprises the following documents: Curriculum and Assessment Policy Statements (CAPS), National Policy pertaining to the Programme and Promotion Requirements of the National Curriculum Statement Grades R-12 and National Protocol for Assessment Grades R-12 (DoE, 2011, p.3). The combined Mathematics Curriculum and Assessment Policy Statement (CAPS) informs teachers of the definition of Mathematics,

specific aims, specific skills, focus of content areas, weighting of content areas and content specification (DoE, 2011, p. 3). These guidelines set the national requirements for teaching and learning in the classroom, whilst the plans in the NCS documents prescribe to schools the way in which teaching and learning of Mathematics should be implemented in the classroom. ABET centres refer to the NCS policy as there is not much else available with regards to ABET official curriculum.

1.7.1 Curriculum

The key curriculum concepts are briefly introduced in this chapter, as they are further elaborated on in Chapter Two. The key concepts in this study are the official, enacted and assessed curriculum.

1.7.2 Definition of curriculum

Kerr (1968) defines curriculum as “All learning which is planned and guided by the school, whether it takes place in groups of learners or in individuals, inside or outside the school” (Kerr as cited in Kelly, 2009, p. 12). The official, enacted and assessed curricula are all, to some extent, “planned and guided by the centre”. This definition best describes curriculum in this study.

Kelly suggests that curriculum is the “totality of the experiences the learner has” (Kelly, 2009, p. 13). This definition might be too broad, as in this study the official curriculum is planned, enacted and assessed as per policy documents set out by the Department of Higher Education (DHET). Whilst adult learning may occur informally, learning for the ABET qualification is a formal process.

1.7.2.1 The Official, Enacted and Assessed Curriculum

The “planning and guiding” that Kerr (as cited in Kelly, 2009) refers to is the official curriculum. The official curriculum refers to policy guidelines and documents, curriculum frameworks and assessment guidelines (Kelly, 2009, p. 11). Planners or consultants may be responsible for the planning of policy guidelines. The plans outline what is intended to happen in the enacted curriculum. However, it is not enacted by the person that developed it. It is implemented and enacted in the classroom by a different person (Lovat & Smith, 1995, p. 13).

The enacted curriculum is when the official curriculum is put into practice in the classroom. The enacted curriculum is the reality of the learners’ experience. The difference between the official and the enacted curriculum may be “conscious or unconscious”; the reasons for this may be that teachers want to make the content more appealing than it really is (Kelly,

2009, p. 11). In addition, the differences between the official and the enacted curriculum may also lie in the varied “realities” of “teachers” and “learners” (Kelly, 2009, p. 11).

The assessed curriculum is defined as continuous, coherent and progressive, and is an important aspect of the quality assurance system at ABET Level 4 (DHET, 2009, p. 9). There are two types of assessment that take place at GETC ABET Level 4. One is formative assessment, whereby learners are assessed through School-Based Assessment (SBA) tasks. The other is summative assessment, where learners write an external examination at the end of the qualification. Both components are documented in the examinations and assessment guidelines document. It is also clearly stipulated in the GETC-ABET interim qualification: SAQA ID 71751.

ABET examinations consist of two components: internal and external assessment. Internal assessments are Site based assessment (SBA) and constitute 50% of the final, examination marks. The other 50% is made of the external examinations. Umalusi defines internal assessment as an on-going process by the facilitator using various techniques. The different types of Assessment are: - oral and written work, classroom based class tests, controlled tests, assignments, projects and examinations (DHET, 2009, p. 13).

As per the guidelines above, it is clear that the ‘assessed curriculum’ for ABET Level 4 includes both a formative and an internal site-based component together with a summative, external examination component.

The relationships amongst the official, the enacted, and the assessed dimensions of the curriculum are the key focus of this study.

1.8 Location of the study

1.8.1 The area

The Public Adult Learning Centre identified for this research project is located in a peri-urban township in the eThekweni area, approximately 15 kilometres north-west of the city centre. The area experienced a significant amount of racial tension in 1985 during the internecine strife which characterised the city in the apartheid era. Homes were looted and residents had to evacuate their properties overnight. In recent years, the township underwent major infrastructure development, allowing for quick and easy access to all areas within KZN (refer to Figure 3). The township and surrounding areas are integrally linked to multiple transport routes. eThekweni Municipality refers to this development as the

“PINK” townships. PINK is the acronym for Phoenix, Inanda, Ntuzuma and KwaMashu. (The term “Phoenix-INK” is also used.)

The population in the PINK area is over 872 000 people. The area has a relatively young population, 39% aged 19 or younger (refer to Table 4). The education levels in the area are relatively low with only 19% having completed secondary school or post-school higher education (refer to Table 5). The information in Table 4 depicts the large number of young adults with low levels of education in the PINK townships. The age profiles and education levels of the learners in the PINK areas are shown in Table 4 below:

Table 4. Age Profile of learners in the PINK area

AGE	PHOENIX-INK
19 years and younger	39%
20 – 64	58%
65 and above	3%

Note. Reprinted from EtheKwini Municipality Northern Urban Development Corridor-Phoenix-INK Local Area Local Plan (p. 9), by eThekweni Municipality, 2011 (prepared by SSI Engineers and Environmental Consultants). Retrieved September 21, 2014 from <http://www.durban.gov.za/Pages/edosca;0,er.aspx>

Table 5. Education levels in the PINK area

Education	Phoenix-INK
School NA	9%
Completed Primary School	40%
Some Secondary School	31%
Completed Secondary School	16%
Higher Education	3%

Note. Reprinted from EtheKwini Municipality Northern Urban Development Corridor-Phoenix-INK Local Area Local Plan (p. 9), by eThekweni Municipality, 2011, (prepared by SSI Engineers and Environmental Consultants). Retrieved September 21, 2014 from <http://www.durban.gov.za/Pages/edosca;0,er.aspx>

1.8.2 The location of the ABET centre

The Northern Urban Development Corridor (NUDC) is a linear system of urban land use linked to multiple forms of transport routes, as shown in Figure 3.

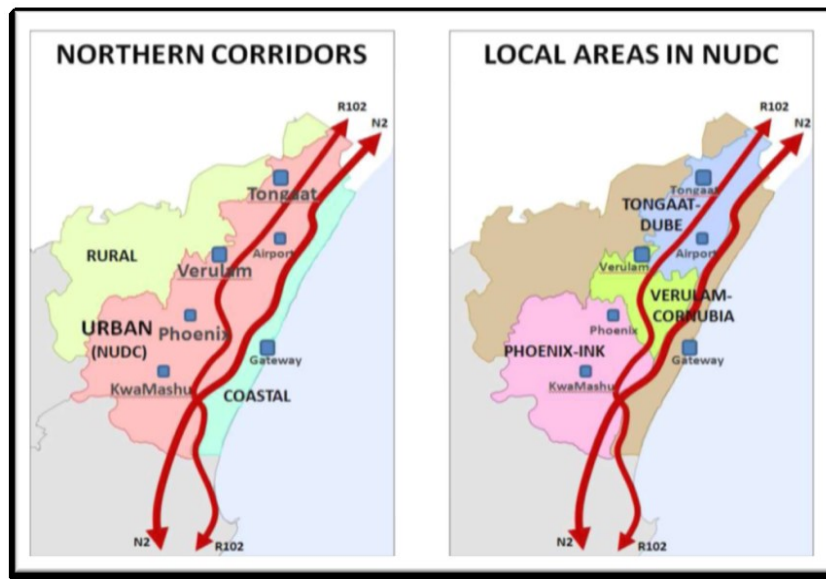


Figure 3. Northern Urban Development Corridor

Note: Reprinted from eThekweni Municipality Northern Urban Development Corridor-Phoenix-INK Local Area Local Plan (p. 6), by eThekweni Municipality, 2011, (prepared by SSI Engineers and Environmental Consultants). Retrieved September 21, 2014 from <http://www.durban.gov.za/Pages/edosca;o,er.aspx>

The ABET centre investigated in this study is in a township that is part of the urban development corridor, as depicted in Figure 3. The location of the centre is ideally situated in terms of access, due to excellent road infrastructure. The centre signals hope for better opportunities and job prospects to the large numbers of school drop-outs in the area and its surrounds. It can be viewed as a change agent in this community by offering opportunities to improve their education levels to the many individuals who were unable to complete their schooling.

1.9 The ABET Centre

The centre opened in 2008. The centre operates from a local high school in the township. The classrooms are shared between the high school and the centre. The ABET classrooms are situated in the same block in the building. This facilitates easy access from one classroom to the next. The classrooms are used by the high school for the “day learners”. The high school has allocated the unused science room to the ABET department. It is presently used by the ABET department as a storage facility for resources. The centre is open from 16.00 – 19.30 on Mondays to Thursdays. The centre staff comprises of a centre manager, a deputy manager and nineteen facilitators. The centre manager and his deputy are both educators at a local school within a short distance of the adult learning centre. The

ABET computer classes were held in a neighbouring primary school, about one kilometre away from the ABET centre.

The brick buildings of the school in which the centre operates are roofed, however, there are a few broken classroom doors and missing window panes. The area surrounding the school is fully fenced. The Applied Agriculture and Agricultural Technology (AAAT) learners, together with their educator from the high school, embark on vegetable gardening on the boundary of the extensive grounds that surround the school building. The harvested vegetables are donated to needy persons in the community. There is a guard on 24-hour duty at the entrance of the premises.

The ABET classes consist of adult learners that are in employment, self-employed or unemployed, and youth who have not completed their schooling. There are approximately 298 learners presently enrolled in ABET levels 1 – 4. The centre experiences many challenges, some of which are limited resources and a lack of electricity. Winter has an impact on learner attendance. The reasons for poor attendance during the winter months are twofold, one being that the days are short, and due to poor or no electricity classes are forced to terminate earlier. Secondly, the cold weather prevents learners from attending, as many learners walk a distance to attend classes.

Centres like Nkanyezi (pseudonym) play an integral role in the socio-economic development of the area. The centre offers needs-based community training. For example, a short course on “Financials” was designed to meet the specific needs of taxi owners in the area. The community indicated a need to incorporate Information and Communication Technology (ICT) in the learning programme. This was the first adult centre to offer the ICT course. The centre also offers training and preparation for learner driver licences and driving licences. It has a partnership with a local driving school in the area.

The centre was oversubscribed in 2013, and it became essential to open a satellite unit. Within a short space of time the satellite unit developed into another main centre.

1.10 Research Questions

The study attempts to answer the following questions:

1.10.1 Main Question

What are the relationships amongst the official, enacted and assessed dimensions of the Mathematics curriculum at the centre?

Sub-questions:

1. What is the official Mathematics Level 4 curriculum used at the centre?
2. How is this curriculum enacted?
3. How is the curriculum assessed?
4. How do these three dimensions of the curriculum impact on ABET Level 4 Mathematics teaching and learning at the centre?

1.11 Methodology

The approach used was a case study approach. The GETC ABET Level 4 Mathematics curriculum at the adult learning centre is the unit of analysis in this case study. The purpose of the case study approach is to describe, analyse and interpret the unit of analysis in great depth (Jarvis, 2010; Rule & John, 2011) and also provide an account of an actual situation which an individual or group has experienced (Gboku, Lekoko & McClellan, 2007, p.175.)

In addition, Rule & John (2011, p.4) point out that a case study is “a systematic and in-depth investigation of a particular instance in its context in order to generate knowledge...” The use of a case study was most appropriate in this research study, as its purpose was “to portray, analyse and interpret the uniqueness of real individuals and situations” (Cohen, Manion & Morrison, 2011, p. 129.) The above definitions of a case study resonated with the purpose of this study. A detailed investigation into the relationships amongst the three dimensions of the Mathematics curriculum was undertaken. This case study endeavoured to provide in-depth information into the curriculum trajectory at the centre – the way in which the official curriculum was enacted and assessed by the teachers of Mathematics Literacy and Mathematics and Mathematics Science.

Data was collected through focus group discussions with learners, lesson observations and semi-structured interviews with the centre manager, deputy centre manager, teachers and learners. Documents such as the teachers’ Mathematics schemes and weekly lesson preparation sheets, the learners’ exercise books and portfolios, site-based tasks and past exam papers were viewed and analysed to ascertain the role of these elements in the three dimensions of the curriculum.

1.12 Outline of Chapters

Chapter Two presents a review of the literature in the field of study. I reviewed existing models and theories on adult teaching and learning, namely Knowles’ theory of andragogy and Illeris’ learning model, Mathematics for adults, and the three dimensions of curriculum: official, enacted and assessed and the relationships amongst them.

Chapter Three outlines the research design and methodology that informed the study. The research design is defined as a qualitative case study. This chapter provides the rationale for selecting a qualitative style within an interpretive paradigm. The selection of site and participants, attention to ethical issues and data collection instruments are described in this chapter.

Chapter Four presents the research findings with reference to the research questions and aims of the study. Findings are presented in terms of the research questions that guided the study according to the emergent themes.

Chapter Five is the concluding chapter. Here, the summary of findings and the recommendations are presented. It also includes suggestions for future studies in the field of Adult Education with reference to the Mathematics curriculum in Public Adult Learning Centres and Adult Community Colleges.

1.13 Conclusion

Chapter One presented the topic under study, the rationale and background for pursuing this study. The main focus in this study is the relationship between the assessed curriculum, on the one hand, and the official and enacted curricula, on the other. The concepts, enacted, official and the assessed curriculum were briefly introduced in this chapter. The overview of the dissertation informs the reader of what to expect in the following chapters.

2. CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

A literature review is a written summary that “describes past and current information related to the research topic” (Creswell, 2012, p. 80) and summarizes what has already been said about the topic (Chilisa & Preece, 2005, p. 60). It situates the researcher’s topic in a “wider context of knowledge and provides a better understanding of the problem that is being investigated” (De Vos et al., 2011, p. 134.) The purpose of my literature review is to identify relevant sources on what has already been published on adult teaching and learning of Mathematics, theories that underpin adult learning and the relationship amongst the three dimensions of curriculum: official, enacted and assessed. The objective of the literature review is to contribute towards a sharper understanding of the problem that is being investigated (De Vos et al., 2011, p. 134).

In Chapter One, the concepts in this study were briefly introduced. In this Chapter a synthesis of selected research on the following is presented: adult teaching, factors contributing to effective teaching of adults, mathematical knowledge of teachers, teacher beliefs, mathematics and numeracy for adults, and the effects of poor mathematics skills. The adult learning theory of andragogy and its critique and the learning model put forward by Illeris are discussed. Curriculum and its definition - the official, the enacted and the assessed dimensions of the curriculum, the limitations of the ABET curriculum, types of assessment, principles of assessment, the “washback effect,” the dangers of teaching for assessment and the conclusion are presented in this chapter.

The curriculum concepts under discussion link to the main research question: what are the relationships amongst the official, enacted and assessed dimensions of the Mathematics curriculum at the centre? The theory on adult learning – andragogy and the learning model by Illeris - link to the characteristics of adult learners and the conditions of learning. Illeris’ learning model describes the learning conditions as “psychological, biological and social conditions” (Illeris, 2009, p. 8).

In the literature review I use the terms “students” and “learners” interchangeably, so too “teachers” and “facilitators”. Prior to 1994, in the previous adult education landscape, the terms students and teachers were mostly used.

2.2 Adult Teaching

Here, I look at key factors that have an impact on teaching and learning among adults. Some key factors affecting adult teaching are: factors contributing to the effective teaching

of adults, the mathematical knowledge of teachers (content/subject knowledge, pedagogic knowledge), teacher beliefs, the ABET Mathematics curriculum and Mathematics for adults.

I examine each of these factors in turn.

2.2.1 Factors Contributing to the Effective Teaching of Adults (Effective Mathematics Teachers)

The literature review identifies three key factors regarding the effective teaching of adults. It is important for teachers “to diagnose where learners are,” (Clements & Sarama, 2014, p. 9.); emphasise learner-centeredness; and ensure learner involvement in diagnosing their own (learner) needs. These are important considerations for the effective teaching of adults (Brookfield, 1995). These key factors are now discussed in relationship to the effective teaching of the Mathematics curriculum in adult education.

In the African context, adult learning was in existence prior to the introduction of formal learning (Fasokun, Katahoire & Oduaran, 2005, p. 34), and also took place informally. In particular, the learning and use of numbers are ubiquitous in everyday life, spanning all ages and in different groups of people. This means that a particular concept for example, numbers, in this study is being encountered in adults’ daily lives (Mirirai, Lillias & Chagwiza, 2012, p. 92). This implies that learners do have prior knowledge of numbers.

Clements & Sarama argue that teachers are expected to “meet the learners at where they are” in order to be effective in their teaching of Mathematics (Clements & Sarama, 2014, p. 9). The challenge lies in how we then diagnose learners’ skills and prior knowledge and decide what aspects of Mathematics are significant. The answer to these challenges is embedded in “learning trajectories” (Clements & Sarama, 2014, p. 9). “Learning trajectories” are defined as “a developmental path which assists in learners reaching (a) goal, together with a set of instructional activities that help in moving learners along that path. Teachers who understand learning trajectories understand Maths; the way learners think and learn Maths, and how to help learners learn better” (Clements & Sarama, 2014, p. 9.)

In addition to learning trajectories, Gboku & Lekoko (2007) and Brookfield (1995) posit that, for effective teaching to occur, emphasis should be placed on learner-centeredness. The teacher is expected to perform a range of significant tasks when designing adult learning programmes (Gboku et al., 2007, p. 89) as outlined below:

learning is to be proactive and stimulating, enhancing learner motivation, providing opportunities for collaborative or social approaches, providing individual enrichment, stimulating self-awareness of learning processes and encouraging meta-cognitive activities and capitalising on situated and workplace learning opportunities.

Knowles (as cited in Fasokun et al., 2005, p. 24), adds that learners should be involved in diagnosing their own needs, planning their activities, selecting resources and evaluating their progress. Furthermore, content, process and product in response to learners' readiness, interests and learning profiles should be adjusted accordingly.

I argue that the focus in adult education should be on learner-centred teaching, that is diagnosing what skills and experiences learners have and to extend their knowledge in the teaching programmes that follow. Stakeholders that are involved in the planning and enactment of the Mathematics curriculum in GETC ABET Level 4 curriculum should take cognisance that the aim of Mathematics Literacy was intended for learners who do not wish to pursue Mathematics as a subject after Grade 9 (Brombacher; North; as cited in Bansilal, James & Webb, 2015, p. 1).

A study conducted by Stevens (as cited in Zeelen, Rampela & Van der Linden, 2013, p. 28) interviewed citizens on their adult education needs. It revealed that many adults faced challenges in daily life tasks, such as making banking deposits and withdrawals, completing forms and reading medical prescriptions:

We cannot read the doctor's prescriptions. In the clinic they tell us several times what to do, but we tend to forget the dosages of the medicines and tablets. That can be dangerous. What happens if we give our child too many tablets or not enough?

(Stevens, as cited in Zeelen et al., 2013, p. 28).

Research studies revealed that many female ABET learners attended ABET classes to improve their basic literacy skills and living conditions (Zeelen et al., 2013, p. 28). In a needs assessment of ABET learners conducted by Rakoma (as cited in Zeelen et al., 2013, p. 89), it turned out that learners' needs included reading and writing of names, appending signatures, communicating in writing with others and having the ability to read and understand issues that apply to their immediate environment, as well as skills to secure employment to generate an income. One of the adult learners commented,

I bought a sewing machine, but if a person comes, I cannot take his or her measurements (Rakoma, as cited in Zeelen et al., 2013, p. 28).

The White Paper acknowledges the need to focus on citizen and social education. The PALCs are “expected to be sensitive to the needs of the community” (DHET, 2013, p. 21). Formal programmes will include the GETC ABET Level 4 and non-formal programmes will be designed to include community-based cooperatives (DHET, 2013, p. 22).

Theoretical and pedagogical knowledge of teachers is another factor that is key to the effective teaching of adults. Wheelahan (2015) posits that Mathematics facilitators should have both theoretical and pedagogical knowledge to be effective in their teaching of adults. Effective Mathematics teachers should be able to discern their teaching practices, to ensure that students are challenged and their potential in Mathematics is being sufficiently developed (Brown, 2016).

2.2.2 Mathematical Knowledge of Teachers

The past four decades have seen significant growth in Mathematical educational research (Kilpatrick, Swafford & Findell, 2001). Today, the majority of nations would require their prospective secondary school Mathematics teachers to have undergone training in at least four broad areas. This would apply in the South African context as well, particularly noting the dire Mathematics results achieved in the Third International Mathematics and Science Study (TIMSS) implemented to test the competency of learners in Mathematics as discussed in Chapter One (Mouton et al., 2012).

The four areas are, firstly, the acquisition of subject (content) knowledge (SK), secondly, pedagogic content knowledge (PCK) and thirdly, education studies or general pedagogical knowledge (Schmidt, as cited in Glover, 2014). These three areas make up key components of the broader notion of teacher competency. The fourth acquisition is attained through practical classroom experience ensuring that the minimum skills are in place (Schmidt as cited in Glover, 2014, p.27).

The concepts of subject (content) knowledge and pedagogic content knowledge are credited to Shulman (1987). Subject knowledge means the knowledge of Mathematics which is the domain of professional mathematicians. Engineers, doctors, scientists, and teachers are some of the professionals who would have mastered the Mathematics content in this area. PCK means pedagogical knowledge related to Mathematics and includes instructional planning knowledge, the knowledge of student learning and curricular knowledge (Schmidt as cited in Glover, 2014, p. 27). PCK is the exclusive domain of the teacher who would build his or her professional knowledge in this field over a period of time (Glover, 2014, p. 27).

We learn from Shulman (1986) that teacher knowledge can be defined in three categories: pedagogic knowledge (PK), subject (content) knowledge (SK) and pedagogic content knowledge (PCK). Shulman's categories of teacher knowledge imply that teachers of Mathematics interpret and apply the curriculum, and they need to reflect on both SK and PCK.

Pedagogic content knowledge means pedagogical knowledge related to Mathematics. This is inclusive of instructional planning knowledge, the knowledge of student learning and curricular knowledge (Schmidt as cited in Glover, 2014).

I also note Ball's domains of mathematical knowledge for teaching, particularly the domain of "horizon knowledge" that bears relevance to this study. 'Horizon knowledge' "refers to teacher knowledge, and how mathematical topics are related in the Mathematics curriculum spectrum" (Ball, Thames & Phelps, 2008, p. 403). An example would be teachers knowing how the algorithm to multiply together two numbers is related to multiplying together two polynomials (Ball et. al., 2008, p. 389).

Ball's sixth domain of teacher knowledge is similar to Shulman's notion of PCK. In addition, Ball (1991) adds that teachers' subject matter knowledge interacts with their assumptions about teaching and learning beliefs and ways in which to teach their Mathematics students. Bansilal et al. (2015) discuss the implications of Shulman's (1986) opinions on the teaching of Mathematics Literacy (ML). Bansilal et al. (2015) posit that teachers of Mathematics Literacy need to know how to teach the Mathematics that is prescribed in the "basic skills topics" (DBE, 2011, p.13). The term "basic skills topics" refers to mathematical skills that learners have acquired prior to their studies in Mathematics Literacy. The implication is that ML teachers need to have a foundation of PCK for Senior Phase Mathematics.

I argue that Mathematics teachers of GETC ABET Level 4 should be familiar with and fluent in the teaching of Mathematics at all levels in ABET, that is from Level 1 – 4. In this way, ABET learners entering GETC Level 4 with learning gaps will be accommodated. Many of the ABET learners entering at GETC Level 4 may have a poor knowledge of Mathematics, resulting from their previous grades. Teachers who are able to teach at the senior phase should be able to guide learners having these gaps through the transition between the phases (Bansilal et al., 2015, p. 4).

Kilpatrick, Swafford and Findell (2001) are other scholars whose work is widely recognised in the field of Mathematics. The term "mathematical proficiency" was coined when realising that there is no appropriate term which captures all aspects of expertise, competence, knowledge, and facility in Mathematics (Kilpatrick et. al., 2001, p. 116). The model of

“mathematical proficiency” (refer to Figure 4) comprises five concepts that are referred to as strands. The strands represent

conceptual understanding (comprehension of mathematical concepts, operations and relations), **procedural** fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), **strategic** competence (ability to formulate, represent and solve mathematical problems), **adaptive** reasoning (capacity for logical thought, reflection, explanation and justification), and **productive** disposition (habitual inclination to see Mathematics as sensible, useful and worthwhile).

The five strands of mathematical proficiency are depicted in Figure 4 below:

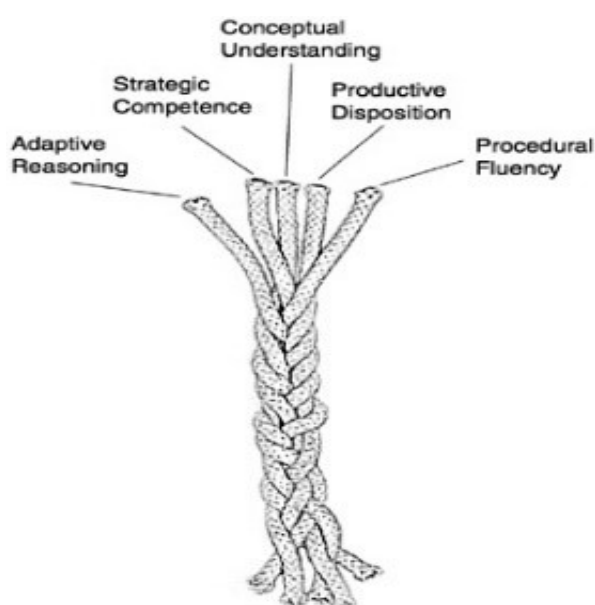


Figure 4. Intertwined strands of proficiency

Reprinted from *Adding it up: Helping children learn mathematics* (p. 116), By J. Kilpatrick et al., 2001, Washington, D.C.: The National Academies Press

Kilpatrick et al., (2001) posits that:

Students with conceptual understanding know more than isolated facts and methods. They understand why a mathematical idea is important and the kinds of contexts in which it is useful. They have organized their knowledge into a coherent whole, which enables them to learn new ideas by connecting those ideas to what they already know. (Kilpatrick et al., 2001, p.118).

Kilpatrick et al's (2001) strand of "conceptual understanding" is exemplified in the following example which is relevant to the conceptual understanding which the learners of Mathematics in this study are expected to develop:

When adding fractional quantities of different sizes, for example, learners may draw a picture or use concrete materials of various kinds to show the addition. They might also represent the number sentence as a story. They refer to the number line, representing each fraction by a segment and adding the fractions by joining the segments. By renaming the fractions so that they have the same denominator, the learners might arrive at a common measure for the fractions, determine the sum, and see its magnitude on the number line. By operating on these different representations, learners are likely to use different solution methods.

This approach allows learners to discuss the similarities and differences of the representations, the advantages of each, and how they must be connected if they are to arrive at the same answer (Kilpatrick et al., 2001). It is important for learners to know that the same answer can be arrived at by using different methods of investigation.

Bernstein (as cited in FitzSimons, 2008, p. 10), posits that from an individual's perspective there is more than one correct strategy in a particular context. The transmission of mathematical knowledge is likely to progress from the concrete to the more abstract. Typically, mathematical knowledge happens the other way around, from the "rule" to the example. The teaching of Mathematics and numeracy to adults may have more in common with the reverse processes that occur mostly in workplace learning. General principles may be understood based on experience, but need to be made concrete in order to be understood. Eventually, the learner will be expected to "develop a repertoire of context-dependent strategies based on experiential learning located in an apprenticeship-like context" (FitzSimons, 2008, p.10).

There is a growing body of evidence that suggests that the "quality, depth and robustness of a teacher's mathematical knowledge, both subject knowledge and pedagogical content knowledge, play a critical role in determining the effectiveness of a Mathematics teacher" (Chisholm & Leyendecker, 2009).

2.2.3 Teacher beliefs

Teacher beliefs play a central role in what happens in the classroom. Mathematical belief research at the primary school level receives more attention (Forgasz & Leder, as cited in Beeli-Zimmermann, 2015, p. 20), whilst it goes unnoticed in the field of adult education (Leder, Pehkonen & Torner, as cited in Beeli-Zimmermann, 2015, p. 21). According to Beeli-

Zimmerman (2015), teachers' prior experiences shape their teaching beliefs. "Beliefs guide teachers' actions in the classroom, influencing what learners learn" (Beeli-Zimmerman, 2015, p.20). Similar to adult learners, teachers also have their own accumulation of educational experiences and beliefs that dominate the enacted curriculum. Teacher beliefs are a product of their socialisation. Beliefs are formed and changed through an individual's social environment. Scholars argue that future teachers enter places of education with beliefs that are shaped by their own educational experiences and this is often more dominant than what they have learned in their teacher training courses (Forgasz & Leder, as cited in Beeli-Zimmermann, 2015, p. 22).

Teacher beliefs are difficult to change as they have been developed over a period of time (Andrew & Hatch, as cited in Beeli-Zimmerman, 2015, p. 23). Pajares (as cited in Beeli-Zimmerman, 2015, p. 23) adds that these beliefs are also "part of a larger system of beliefs about the world."

Taylor (as cited in Beeli-Zimmerman, 2015, p. 23) examined relationships between school lives of adult educators and their beliefs about adult teaching. The study findings revealed "little discrepancy from the participants' perception of their past school lives and their present beliefs about teaching adults." In addition, many scholars conclude that "teachers, despite attending courses and workshops, are most likely to teach maths just as they were taught" (Ball; Handal, as cited in Beeli-Zimmerman, 2015, p. 23).

2.2.4 Mathematics for Adults

The aims formulated for Mathematics Literacy in the ABET curriculum for adults identifies a number of key considerations regarding the ABET Mathematics curriculum, namely, functionality, relevance, workplace competencies and a numerate literate citizenry. One of the principles of assessment, that of currency, discusses the relevance of keeping up with present affairs and the life-world of ABET learners (DHET, 2009).

Mathematics Literacy (ML), a learning area introduced in 2006, addresses some of these issues. The aim of ML was to prepare learners for the 21st century, with a curriculum that promoted learner-centeredness. Despite the aims of ML stating that learners are to be prepared for the 21st century, studies conducted found the Mathematics curriculum to have many of its "origins from earlier generations," and it is "less relevant to someone living in the 21st century" (Van Etten & Smit, 2005, p. 52).

The competencies developed through Mathematics Literacy are:

To allow individuals to make sense of, participate in and contribute to the twenty-first century world – a world characterised by numbers, numerically based arguments and data represented and misrepresented in a number of different ways. Such competencies include the ability to reason, make decisions, solve problems, manage resources, interpret information, schedule events and use and apply technology (DBE as cited in Bansilal et al., 2015).

The aim of Mathematics Literacy is to enable adults to:

participate meaningfully in decisions centred in the various contexts they encounter...(and) to access, use, interpret, and communicate mathematical information and ideas, in order to engage in and manage the mathematical demands of a range of situations in adult life. (PIAAC Numeracy Expert Group, as cited in Bansilal et al., 2014, p. 1157 – 1158)

Mathematics Literacy is viewed as a learning area that is driven by “life related application of Mathematics” (DoE, 2003. p. 9). This learning area was to prepare the learner for the “real world.” Bansilal et and Debba (2011, p. 1) concur that contexts in ML demand real life authenticity, as its emphasis as a learning area is motivated by life-related applications of Mathematics. Mathematics Literacy is not about learning more Mathematics, it is about developing skills that will enhance participation in contexts that use numerically based arguments (Bansilal et. al, 2012, p. 2).

The Qualifications and Curriculum Authority (QCA) in the United Kingdom defines functional skills as “practical skills in maths that facilitate individuals to work confidently, effectively and independently in life” (FitzSimons, 2008, p. 8). Kantner (2009, p. 4) argues that in “a depressed economy, strong Mathematics skills enhance employability by increasing job performance, productivity, and access to further education and training.”

In addition to employability, Bingman and Schmitt (2008) posit that the Mathematics curriculum for adults should be designed to assist learners to link Mathematics to their daily lives by using authentic problems and materials from learners’ lives, using instructional strategies that build on learners’ prior learning and experience and teaching new ideas within meaningful real-life contexts. These initiatives can be supported by teachers using hands-on visual representations and real-life resources to explore concepts and to solve problems (Bingman & Schmitt, 2008, p. 28).

Functional Mathematics has a practical edge that makes for meaningful learning that adults can apply in everyday life. FitzSimons (2008) explains that Functional Mathematics may

assist adult learners to shop wisely by working out the lowest prices of items. For example, adults having a knowledge of fractions will be able to work out that 50% is the same as half price and 25% is the same as one quarter or $\frac{1}{4}$. Adult learners may use mathematical principles when purchasing a car, and in other aspects of their lives such as home decorating within a budget.

In the workplace, adult learners in the hospitality field may use the mathematical concept of probability to determine occupancy rates during the holiday periods, and similarly work out menus determined by weather conditions. For example, on a cold day there is a greater probability that soups will sell better than salads.

Similarly, in the field of healthcare, patient numeracy regarding, for example, dosage amounts and timing is critical for healthcare decision-making, for self-management and in the household. This knowledge can be extended into the community as well. In the African context, health issues are rampant, yet health interventions for basic healthcare, pre- and post-natal care and HIV/AIDS still continue to be neglected in communities (Fasokun et al., 2005, p. 39).

2.2.5 Effects of Poor Mathematics Skills

Poor Mathematics skills affect and inhibit citizen's daily lives. This "inhibition" has an effect on their workplace activities. These findings were revealed in a survey conducted by the Confederation of British Industry 2009 (Kantner, 2009). It was reported that poor Mathematics skills negatively impact customer service. The survey also highlighted the low technological skills present in the available workforce. Career and employment opportunities are limited as low levels of Mathematics literacy are "a barrier to both adult employability and recurrent education needs in the global workplace" (Kantner, 2009, p. 6). Kantner (2009) argues that basic calculation, estimation, data analysis, and probability interpretation are all crucial for active participation in civil society.

2.3 Adult Learning

2.3.1 Andragogy

The previous section focused on the teaching of Mathematics and Mathematics Literacy to adults. I now look at the theory of "andragogy" that is popularly referred to in adult education.

Andragogy is a popular theory used in adult education. Knowles (as cited in Gboku et al., 2007, p. 61), describes it as "the art and science of helping adults learn." Andragogy characterises "adult learners as self-directed, independent and problem-centred people who are curious to apply what they can learn immediately." Knowles refers to his six

assumptions as a “model of assumptions” and has also called it a “system of concepts” (Knowles as cited in Fasokun, Katahoire & Oduaran, 2005, p.43).

Knowles argues that a learner’s self-concept moves from that of being a dependent personality to that of being a self-directing individual. Secondly, he claims that adults accumulate enormous experiences, which are rich learning resources. Thirdly, Knowles argues that readiness is closely linked to the developmental tasks of adults’ social roles. Fourthly, people mature as time goes by – from future application of knowledge to immediacy of application. An adult becomes more problem-centred than subject-centred in their learning (Knowles, 1985, p. 44 – 45). Adding to these assumptions were two more, the fifth being that intrinsic motivation is more important than external motivation (Knowles 1985, p.12). The sixth assumption states that “adults need to know why they need to learn something” (Knowles,1985). The six assumptions that characterise adult learners are relevant to this study.

In support of andragogy, scholars of adult education suggest that it is important for people to learn from life situations. Life challenges and situations should influence and inform an adult’s learning processes as this contributes to the social aspect of the learner. In addition, learning based on real life experiences makes sense, thus preparing the learner for future life tasks within their immediate surroundings. For example, the study of Gboku et al. (2007) on female prisoners who were asked to relate an account of the criminal offences they had committed and how they intended to make up for time lost whilst in prison exemplified a learning programme that addressed the life contexts and real issues confronted female prisoners. This approach to learning ultimately becomes meaningful as a learning event (Gboku et al., 2007, p. 171). This resonates with Knowles’ second assumption of adults being rich resources of learning.

Since adult learners are rich and excellent resources for learning, an association needs to be made between existing knowledge and new information through active involvement such as “sharing and exchanging information, questioning assumptions and theories, and making use of interaction techniques” (Gboku et al., 2007, p. 172). At times the facilitator may not find relevant information to connect new information to, when teaching an adult class. In this instance, adult learners can be used as important resources by sharing their experiences. Freire proposed the concepts of the student-teacher and teacher-student relationship. These concepts indicate that the teacher and student learn together (John, 2009, p. 47). In using the concepts of student-teacher and teacher-student, teachers would not be seen as the “depositors of valuable information” (Freire, 1970, p. 47).

Ideally, learning should develop an adult's self-concept, in assisting them to become "responsible, self-directing and independent" (Gboku, et al., 2007, p. 172). Facilitators using a variety of methods and approaches in their teaching will lead to adult learners developing self-direction and independence. It is necessary to explore different topics so that learners' diverse needs and interests are taken into consideration. Learner-centred teaching plays a significant role in achieving the above.

Adult learning can be made meaningful using the principles of andragogy in the African context. Teachers in the adult education sector should take cognisance of "questioning assumptions" (Gboku et al., 2007, p. 172). Adult facilitators should critically question themselves on the impact that experiential learning, self-directedness, problem-based learning and goal setting has on the day-to-day activities of an African learner. An important andragogic principle is that learning should develop from the interests, needs and other life challenges of the learners. It is critical for adult facilitators to ask, "What are the challenges of an adult learner in an African context?" (Gboku et al., 2007, p. 173). By approaching teaching from this aspect, the needs and interests of the learners are prioritised, thus ensuring that learning is meaningful and related to the learner's reality.

Andragogy is a learner-centred adult education concept (Gboku et al., 2007). In both andragogy and outcomes based education the learner takes responsibility for learning. The pace of work is determined by the learner. In both of these paradigms the aim of learning is to transform learners into critical thinkers and self-directed learners.

2.3.2 Critique of Andragogy

The theory of andragogy has been contested, with the main point of contention being whether it should be considered a "theory" of adult learning. Hartree (1984) argued that it is unclear whether it is a theory of learning or teaching, or principles of good practice, and whether adult learning is different from child learning. Hartree contends that Knowles' assumptions are descriptions of and prescriptive scripts for the adult learner, or what the adult learner should be like (Hartree, 1984, p. 205). She continues her critique by adding that, although Knowles approaches his model of teaching from the point of view of a theory of adult learning, he does not establish a "unified theory of learning in a systematic way" (Hartree, 1984, p. 206 – 207).

Similarly, Brookfield (1986, p. 98) also questions whether andragogy is a "proven theory," assessing to what extent a "set of well-grounded principles of good practice" can be derived from andragogy. He argues that three of the assumptions are problematic when drawing inferences for practice. The first assumption about self-direction is more a desired outcome than a given condition. The third and fourth assumptions relating learning to particular social

roles with a focus on immediate application can lead to a narrow, reductionist view of learning. These two assumptions “could lead practitioners to equate the sum total of adult learning with instrumental learning; that is, learning how to perform at an improved level of competence in some predefined skill domain, in essence ignoring the complexity of learning” (Brookfield, 1986, p. 68).

Brookfield agrees to the “experience assumption” being well-grounded. However, he feels that even this assumption can be questioned. The fact that adults have lived longer than children and thus have greater experience than children does not necessarily translate into quality experiences that can become a useful learning resource, as certain life experiences can function as barriers to learning (Merriam & Caffarella, 1991). Hanson (1996) adds that children in certain contexts may have a range of experiences qualitatively richer than some adults.

From a critical perspective, Sandlin (2005) applied critical, feminist and Afri-centric theoretical orientations to andragogy and identified five issues that cut across the three different perspectives. Firstly, andragogy is criticised for assuming education is value-neutral and apolitical. Secondly, andragogy assumes adult learners all look and learn the same – and this universal image is that of a white middle-class individual learner. Thirdly, other ways of learning are ignored, thus resulting in silencing other voices. Fourthly, because the relationship between self and society is ignored, andragogy does not consider structural systems, for example privilege and oppression that are rooted in race, gender, culture and class, and the impact that these have on an individual’s development of learning (Sandlin, 2005, p. 28). The last issue that cuts across critical, feminist and Afri-centric perspectives is that andragogy reproduces society’s inequalities and supports the status quo.

From a culture-specific lens, citing several studies ranging from Hmong refugees to Caribbean immigrant women, claim that andragogy’s application to foreign-born learners does not characterise the experiences of some adult immigrants (Alfred, 2002). Moreover, by overgeneralising the characteristics of a particular group of learners, adult immigrant learners’ values, experiences and realities are not likely to resemble the discourse of the dominant population (Lee, as cited in Alfred, 2002).

Despite these criticisms levelled at andragogy, adult facilitators continue to find Knowles’ theory helpful and whilst acknowledging its flaws, adult stakeholders find it a useful rubric in understanding adult learners (Merriam & Caffarella, 1991, p. 277).

2.3.3 Illeris' Learning Model

Illeris offers an alternative learning model of adult learning that addresses some of the limitations of andragogy. Illeris is well-known in Scandinavia for developing work on project studies in theory and practice. Illeris claims that all learning infers the “integration of two different processes – the external interaction process between the learner and his social, cultural and material environment and an internal psychological process of elaboration and acquisition. Learning takes place when both these processes are actively involved” (Illeris, 2009, p. 9).

Figure 5 explains the complex processes of learning. Social interaction is illustrated with a vertical line in Figure 5. The environment or society is located at the base of the line (at the social level), with the individual at the top (at the subjective level). At the individual/subjective end is a horizontal line which depicts personal acquisition, between the end points of content (cognition) and the incentive (emotion). Content is essential as there can be no learning without it, i.e. learning ‘something’. Incentive is also necessary as any mental function requires the use of mental energy, i.e. there must be motivation and interest for learning to be undertaken.

Illeris defines learning as “any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing” (Illeris, 2009, p.7). Learning takes place in learners’ organisations and groups. Illeris argues that it is inaccurate to think that learning is “the preserve of individuals as both processes occur simultaneously, by the social interaction of the learner with others and within his/her environment.” Even when learning alone, influences received through group interaction shape the mediated acts of reading and imagery (Illeris, 2009. p.12).

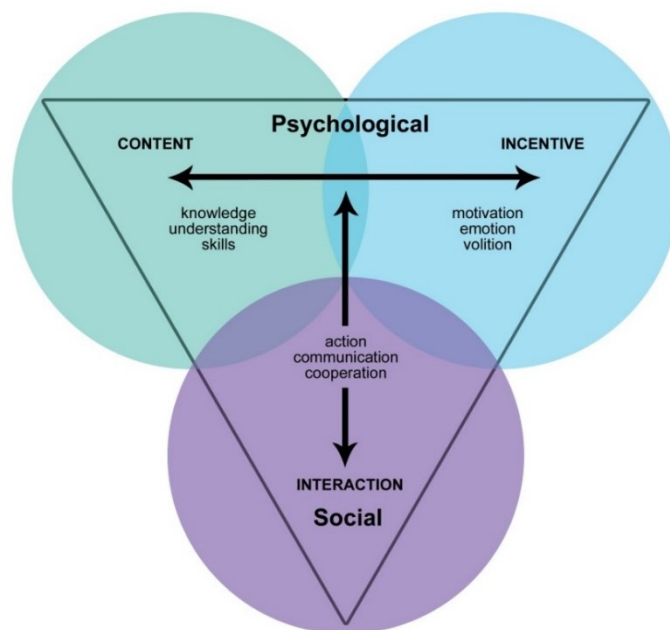


Figure 5. Fundamental processes of learning

Adapted from *Contemporary theories of learning. Learning theorists...in their own words* (p. 10), by K. Illeris, 2009, London: Taylor & Francis Group.

As seen in Figure 5 the two double arrows span a triangular field between three angles. These three angles depict three spheres of learning, and it is the core claim of Illeris' understanding that all learning will always involve all three dimensions (Illeris, 2009, p. 9). The content dimension is what is learned. This is usually described as knowledge and skills, as well as opinions, insight, meaning, attitudes, values, ways of behaviour and strategies (Illeris, 2009). The incentive dimension provides the mental energy for the learning process to take place. It constitutes elements of feelings, emotions, motivation and volition (Illeris, 2009). The social dimension is the interaction process between the learner and the societal, cultural and material environment" (Illeris, 2009, p. 12). Should the interaction process be unacceptable to the learners, then something quite different may be learned, for example, negative impressions of the teacher, or other learners or the school context then the learning will be compromised (Illeris, 2009, p. 12).

Illeris (2009) exemplifies the three spheres of learning in the following example. During a chemistry lesson the teacher explains a chemical process and "the learners are supposed to be listening and possibly asking questions to ensure they have understood correctly." Absorbing what the teacher is teaching is a parallel process. They should be able to relate psychologically and after what is being taught to what they should already have learned, but this may not happen as intended. This may be due to the tangible factors impacting on the enacted curriculum, for example, the desired outcome was not achieved because "the teacher's explanation was not sufficient, or incoherent, or there might have been

disturbances” in the context. If this is so, then the explanation would be understood partially or incorrectly, and the learning result would be inadequate. The learners’ acquisition of knowledge “may also be insufficient due to lack of concentration and this also leads to deterioration in the learning result.” There may be gaps in the students’ prior learning, making them unable to understand the teacher’s explanation. This example indicates that acquisition is not only a cognitive matter but also involves the incentive dimension (Illeris, 2009, p. 11 – 12).

The incentive dimension is critical, because it concerns itself with how the situation is experienced, “what sort of feelings and motivations are involved and the nature and strength of the mental energy that is mobilised.” The “content and the incentive are significantly dependent on the interaction process between the learner and the social, societal, cultural and material environment” (Illeris, 2009, p. 12).

Similarly, an example of the psychological and social dimensions of learning can be applicable to an adult learning class. An adult learner in a Mathematics class engages both the cognitive and emotional dimensions. The learning activity will be influenced by social interaction with the facilitator and other learners in the class. Psychologically, society’s norms, internalized by the learner, that engaging in learning is desirable to function in today’s world, interact with the other two dimensions of the learning process. The interaction dimension provides the impulses that initiate the learning process (Illeris, 2009).

Many research studies conducted by Illeris are situated in professional/workplace contexts. Traditionally, learning theory was a branch in the field of cognitive psychology. It included factors such as perception, with memory and thinking being central to the process of learning. More recently, learning has been described as a social process, taking place in interactions between people – a social-constructivist view, for example in communities of practice (Illeris, 2009).

2.3.4 Critique of Illeris’ Learning Model

From an adult learning perspective, one critique might be that Illeris’ model covers learning generally, rather than adult learning specifically. A response to this would be that the elements of the model can be specified according to the particular participants, subject and context of learning, and so the model can be applied to adult learning situations.

2.4 Curriculum

The study focused on the three dimensions of curriculum. I used the key concepts, the official, enacted and assessed curriculum as the conceptual framework. This assisted me in the conceptualisation of the study, the formulation of research purpose and questions, and the analysis and interpretation of the data.

2.4.1 Definition of Curriculum

The definition of curriculum according to Kerr (1968, as cited in Kelly, 2009) and Kelly (2009), was discussed in Chapter One. Porter (as cited in Kurz, Elliot, Wehby & Smithson, 2009, p. 132) adds that curriculum is the distinction between the content of the three spheres. This definition is relevant to this study as the study investigated the relationship amongst the three dimensions of curriculum – official, enacted and assessed. Porter (as cited in Kurz et. al.,) looks at the content of the three types of curricula: official, enacted and assessed and its alignment.

The official curriculum is planned according to the learning outcomes of the learning area and grade levels. The content is enacted by classroom teachers, and the content is measured by student assessments; this represents the assessed curriculum (Porter, as cited in Kurz et. al., 2009, p. 132).

Porter (as cited in Kurz et. al., 2009, p. 132) notes that understanding and knowing the curriculum are powerful sources of information for teachers explicitly, as the official curriculum contains the content for classroom instruction, the enacted curriculum focuses on the students' learning opportunities, whilst the assessed curriculum reveals the content areas in which students are being assessed (Kurz et. al., 2009).

The concerns about alignment in the three spheres of curriculum refer to the level of agreement between these curricula, namely content overlap and the extent to which it facilitates student learning (Kurz et al., 2009).

The literature now discusses each sphere of curriculum. The study focused on the relationship amongst the official, enacted and assessed Mathematics ABET GETC Level 4 curriculum.

2.4.2 Official Curriculum

The official curriculum can be represented in a number of different ways. It may include an "official syllabus document, textbook, teachers' teaching plans from one school, and a curriculum framework that is a broad policy document" (Hoadley, 2009, p. 30). These components come approved by the Department of Education and are sometimes referred to as the "planned, intended or prescribed curriculum" (Kelly, 2009. p. 9).

The ABET Mathematics curriculum in both Mathematics Sciences and Mathematics Literacy is sourced from the CAPS Mathematics official curriculum document. The official curriculum for Mathematics ABET GETC: Level 4 is unit standard based, and is registered on the National Qualifications Framework. The Mathematics curriculum is offered in two streams: Mathematical Literacy and Mathematical Sciences. As discussed in Chapter One, Mathematics Literacy was introduced in 2006, especially catering for learners who did not want to pursue further studies in the Mathematics learning area after completing Grade 9.

2.4.3 The Enacted Curriculum

The enacted curriculum can be viewed as an action related process as it represents “what actually happens when the official curriculum is enacted” (Billett, 2006, p. 32). The notion of the enacted curriculum, as described by Hoadley (2009, p. 37),

provides a more complete view of teaching and learning. It offers an explanation as to why learners often learn differently to what is taught. The enacted curriculum stresses the facilitator's role as an interpreter of the curriculum. It illustrates how facilitators' actions – both good and bad, thoughtful and thoughtless – transform the enacted curriculum.

Teachers interpret and adapt the curriculum according to their context, values and attitudes, beliefs and knowledge. In reality, the enacted curriculum strays from the prescribed curriculum (Hoadley & Jansen, 2009). The enacted curriculum is the reality of the learners' experience and it becomes the experienced curriculum of the learner. There are other factors that influence the enactment of the curriculum.

Gaps or differences between the official and enacted curriculum may be conscious or unconscious. The cause of a gap may either be “a thoughtful attempt by the teacher to present the content in a more appealing way than it really is or, since teachers and learners are human, the realities of any course will not fully fulfil the hopes and intentions of those who have planned it” (Kelly, 2009, p. 11).

Stenhouse (as cited in Lovat & Smith, 1995, p. 14), points out that the gap between the intention and the operationalizing of the intention should be an important focus in future research. Similarly, Lovat and Smith (1995) agree that there are great differences between what writers of a curriculum intend and what actually does happen in the enacted curriculum.

2.5 Limitations of the ABET Mathematics Curriculum

The teaching of Mathematics plays conflicting roles in adult education. Adult learners that have a poor knowledge of Mathematics, “can be a source of disempowerment for adults on an individual level and (this) becomes a gatekeeper to adult employability” (Kantner, 2009, p. 6). Poor Mathematics skills and knowledge are further associated with a number of negative issues, one being low-skilled employment and lower income-earning groups (OECD 2013; Beeli-Zimmerman, 2015).

The learning outcomes in the Mathematics CAPS (DoE, 2011) official curriculum document are problematic, primarily because the document has many of its origins “from earlier generations,” which makes it “less relevant to someone living in the 21st century” (Van Etten & Smit, 2005, p. 52). Gravemeijer (as cited in Van Etten & Smit, 2005, p. 48) explains that the subject matter that is to be mathematised should be experientially real for the students”. The following example would have relevance to an adult’s daily experiences.

On a societal level maths can become a way for dominant cultures to marginalize subgroups within societies - instead of liberating non-dominant groups, maths can be used to suppress subgroups’ entry into occupation thus denying them full social and political participation. (Kantner, 2009, p. 6).

Pedagogy is defined as the art of teaching. The end point of effective pedagogy is learners’ acquisition of knowledge, skills and dispositions demonstrated both within the school environment and outside it (John, 2006). Thus, the nature and extent of teachers’ pedagogy plays an essential and unifying role in interpreting the official curriculum into plan, or may have an adverse effect, resulting in widening the gap between official and enacted curricula (Chisholm & Leyendecker, 2008).

A key factor affecting the shape and variability of the enacted curriculum is teacher knowledge. Previous research studies have not sufficiently explored the relationship between subject matter knowledge for teaching and how it relates to learners’ achievements. In contrast to these findings, Ball et al., argues that learner achievement is determined by the teachers’ use of subject matter content in carrying out tasks of teaching effectively (Ball et al., as cited in Bansilal, et al., 2015, p. 2). The latter view implies that mathematical knowledge involves more than the teacher just attending mathematical courses for development. In addition to this, teachers should be able to calculate correctly and know how to use diagrams to represent mathematical concepts and procedures to students. Learners should be provided with explanations for common rules and mathematical procedures, and their work should be analysed and solutions to the problems explained (Ball et al., 1990).

Weak teacher pedagogy affects curriculum interpretation. The teacher's lack of pedagogic knowledge in conjunction with "low levels of planning and preparedness" creates "gaps between the official and the enacted curriculum" (Hoadley, 2009, p. 37). This in turn, affects how teachers make meaning when analysing the official curriculum. In this study, I refer to teachers' interpretation of the unit standards. Policymakers often assume that curriculum standards make policy requirements sufficiently clear for teachers to interpret, but this may not be the case. In practice, 'reading' the curriculum requires an application of teacher knowledge and pedagogy (Hoadley & Jansen, 2009, p. 104). If these are weak, curriculum interpretation is adversely affected.

Another factor affecting the delivery of the enacted curriculum is that the stakeholders responsible for the development and planning of the official curriculum are not those who enact it. Developers and planners may include groups of people, inclusive of private material developers, international agencies or planners from the Department of Education. Most often, the planners and developers are not responsible for curriculum enactment and implementation at classroom level. This results in the enacted curriculum being disconnected and disjointed from what the planners actually had in mind during the planning and development stages (Lovat & Smith, 1995, p. 17).

Hoadley and Jansen (2009) and Lovat and Smith (1995) concur that there are a multitude of factors and external constraints that influence how teachers teach. These factors include "the ways in which teachers and learners feel at particular times (and) physical factors such as availability of appropriate resources" (Lovat & Smith, 1995, p. 14). Contextual factors, space, time and lack of resources may also hinder the delivery of the enacted curriculum. Some of these factors could be a lack of training, insufficient resources, the experience of teachers and their assumptions. Basic resources such as textbooks, stationery, wall charts, sharing of resources, and audio-visual aids are important for optimal delivery of the curriculum.

A lack of resources contributes to the gaps between the official and enacted curriculum. Teaching adults over many years, I have identified that resources do enhance the quality of teaching and learning and contribute towards raising the level to which a curriculum plan can be implemented. There is a dismal dearth of resources available to teachers in many ABET classrooms (DHET, 2013, p. 19).

2.6 Assessed Curriculum

The assessed curriculum is the third aspect of curriculum that the literature looks at. Assessment and evaluation are parallel processes and both these concepts have common

features. While the terms are sometimes used synonymously, it is useful to see assessment as relating to judgements made about learners' performances, and evaluation as a broader concept which relates to programmes or courses as a whole (ABET, 2005). It is important for educators to be conscious whilst conducting assessment that it is the learners' knowledge and skills that are being assessed, and not the learners themselves (Jarvis, 2010).

2.6.1 Types of Assessment

Prior to the implementation of the CAPS curriculum, tests and examinations were the primary methods of assessment. In the new education landscape, the role of assessment is described as a process of collecting and interpreting information to determine a learner's progress. The curriculum asserts that assessment should be continuous, and should include formative and summative assessment (DoE, 2011).

2.6.2 Types of Assessment Used in Mathematics: ABET GETC Level 4

The four types of assessment prescribed by DHET for the GETC ABET Level 4 qualification are: - baseline, diagnostic, formative and summative assessments (DoE, 2011, p. 154).

Baseline assessment: Baseline assessment is used to find out learners' prior knowledge and basic skills. This assessment is conducted prior to teaching of a specific learning area or for placement purposes in the ABET levels. A comment made by the administrative team at the centre is that "baseline assessment is used when a learner that is registering does not have any previous records of learning." This assessment is necessary to diagnose "where learners are at" as discussed in paragraph 2.2.1.

Diagnostic assessment: The learners' difficulty in understanding content is diagnosed during this type of assessment. Psychosocial factors such as negative attitudes, Mathematics anxiety, poor study habits, and weak problem-solving skills are also discovered. It is a form of formative assessment that leads to intervention and remediation (DoE, 2011, p. 154).

Formative assessment: Formative assessment occurs during the process of teaching and its purpose is to enhance learning. It is thus primarily assessment for learning rather than just assessment of learning. It may occur formally through, for example, a class test that enables a teacher to understand learners' strengths and weaknesses, and to intervene appropriately. It may also happen informally, through oral questions in class and the assessment of written class work, for example. It assists in the teaching and learning process because of its flexibility. It is utilised in many different ways and at any time during a Mathematics lesson, e.g. oral testing at the beginning, during, or at the end of each

lesson. Teachers may use “formative assessment” as an evaluation tool. It is developmental and is used to inform both the teacher and the learner about how the learner has progressed (or not) (DoE, 2011, p. 154).

Summative assessment: The external examination is the summative assessment in the GETC ABET Level 4 qualification. The results of summative assessment are for promotion purposes. The GETC-ABET Level 4 qualification comprises of two equally-weighted components at 50% each, namely site-based tasks and external examinations. This could be viewed as a “snapshot” whilst formative assessment is viewed as a “video” of a learner’s progress (DoE, 2011, p. 154). The guidelines for SBA tasks in the Mathematics learning area comprises of a Learner’s Book with the assessment tasks. The Educator’s Guide includes the assessment instruments that are used to assess learner performance. Guidelines are clearly stipulated in the ABET Policy Framework (RSA, 2009) on how to implement the SBA tasks (RSA, 2009, p. 9), including the principles of assessment.

2.6.3 Principles of Assessment Practices

The Department of Higher Education and Training (DHET) views assessment as a process of making decisions about a learner’s performance. It collects and arranges evidence of learning, in order to review what learners have achieved. ABET learners compile portfolios that are submitted for external moderation at the end of the qualification (RSA, 2009). Figure 6 below depicts departmental principles of assessment.

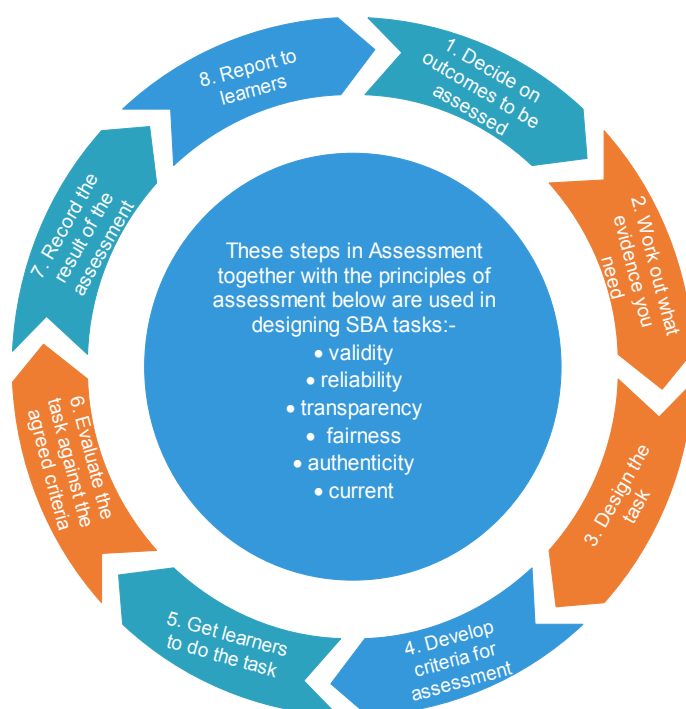


Figure 6. Principles of Assessment

Adapted from *DHET, 2009*.

Each principle and its definition are explained in the table below. The principles of assessment should be adhered to as the learners have a right to appeal their results.

Table 6. Principles of assessment

Validity	Assess what is supposed to be assessed. Examination question papers and SBAs take the US, and their related assessment criteria into account in setting appropriate types of questions
Reliability	Assessment should produce reliable results instructions are clear, consistent and unambiguous Assessment criteria are strictly adhered to Marking guidelines/memoranda are clear and markers apply the same standard
Transparency	Accomplished through guidelines, uniform SBAs and national examinations are moderated internally Papers and SBA tasks are moderated externally by Umalusi Stakeholders know what to expect and candidates have the right to appeal
Fairness	Assessment does not disadvantage anybody (based on age, race, gender, ethnicity, geographic location) Assessment is accessible to all candidates Covers different cognitive levels Nature of the learning environment of learners is considered
Currency	Assessment keeps up with current events and life-world of ABET learners. This is reflected in the content and nature of the texts selected, and the topics offered for interaction
Authenticity	Assessment is original and encourages originality, creativity and avoids repetition. It consciously tries to avoid predictability

Note. Adapted from *DHET, 2009*.

2.6.4 The “Washback” Effect

A definition of “washback” is the extent to which tests and examinations influence teachers teaching and influences the teaching and learning (Spratt, 2005, p. 8). The “washback” effect, affects various aspects in the classroom namely: curriculum, materials, teaching methods, feelings and attitudes and learning (Spratt, 2005, p. 8). I will discuss three aspects of the classroom: curriculum, materials and dangers on teaching for assessment.

In relation to curriculum, studies conducted in Sri Lanka concluded that “washback” has the effect of focusing teaching on areas that are most likely to be tested (Spratt, 2005, p.9). Similarly, Lam (1994 as cited in Spratt, 2005, p. 9) reported that emphasis in teaching is concentrated on those parts of the exam that carry the most marks.

Materials refers to exam-related text-books and past papers. Lam (1994 as cited in Spratt, 2005, p. 11) refers to teachers as “textbook slaves” and “exam slaves”. “Textbook slaves” are those teachers who rely heavily on text books in the class, whilst the “exam slaves” rely heavily on past exam papers. Lam reports that teachers believe that the best way to prepare students for exams is by engaging in past exam papers (Spratt, 2005, p. 11).

Rule (2015a), illustrates the “washback” effect (refer to Figure 7 below). The figure illustrates how the curriculum discourse can be dominated by assessment. This occurs when the enacted curriculum is governed by the assessed curriculum.

2.6.5 Dangers of Teaching for Assessment

Teaching for assessment may have undesirable consequences on the enactment of the curriculum. The focus of the enacted curriculum becomes exam-oriented and previous exam papers dominate what needs to be taught, whilst other subject content may be left out (Rule, 2015a). This results in the narrowing of the curriculum content taught. Figure 7 below illustrates how summative assessment may come to dominate teaching.

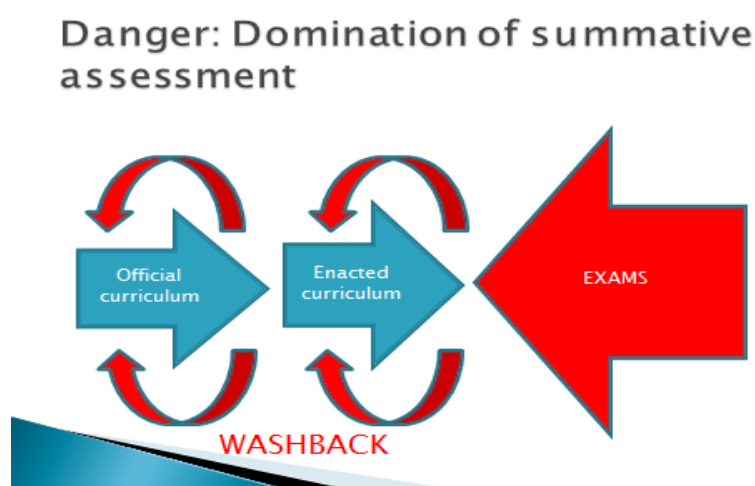


Figure 7. Dangers of teaching for assessment

Reprinted from *Dangers of teaching for assessment: PowerPoint slides* (slide 12), by P. Rule, (2015a).

2.7 Conclusion

This chapter presented relevant literature that pertains to adult teaching and learning. The literature looked at adult teaching, effectiveness of teaching adults, mathematical knowledge and teacher beliefs, the ABET Mathematics curriculum and Mathematics and numeracy for adults. The theories of andragogy and its critique and Illeris’ learning model - three dimensions of learning, psychological, biological and social, were discussed. Since the focus in this study is the relationship amongst the three dimensions of curriculum, each

aspect was discussed. The different factors that attribute to gaps between the official and enacted curriculum were included. The dominance of summative assessment, teaching for assessment and the “washback effect” were included for discussion in the chapter.

Chapter Three will look at the methodology used in this study.

3. CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The purpose of this research study is to investigate the relationship amongst the three dimensions of curriculum: the official, the enacted and the assessed ABET Level 4 Mathematics curriculum at an adult learning centre. In this chapter, details of the research design and methodology employed to conduct the study are explained. A research design typically involves a set of sequential steps (Creswell, 2012, p. 20). Methodology is an inclusive approach to research connected to the paradigm, while the method refers to the tools used for data collection and the analysis of the data (Mackenzie & Knipe, 2006, p. 5). The chapter on methodology is important for the researcher, because it locates the paradigm and style of the study, and provides a framework for the researcher to work within. This study adopted an interpretive paradigm using a qualitative style.

Section 3.2 discusses the research paradigm adopted in the study. Section 3.3 deals with the style of the study. Section 3.4 describes the setting and context of the research. Section 3.5 presents the approach used. Section 3.6 discusses the site and sampling. Section 3.7 discusses the qualitative data collection methods used. Section 3.8 discusses data analysis. Section 3.9 discusses the limitations of the study. Section 3.10 addresses ethical issues, followed by trustworthiness and triangulation in Section 3.11 and researcher positionality in Section 3.12, ending with the conclusion.

3.2 Paradigm

I worked within an interpretive paradigm in this study. Paradigms suggest a particular worldview for the researcher on what acceptable research is, and how to achieve the process (Bertram & Christiansen, 2014, p. 22). These worldviews are shaped by the learning area of the researcher, beliefs of supervisors in the faculty domain of the student and past research experiences (Creswell, 2012, p. 6). Each paradigm is governed by its own ontological and epistemological assumptions. The ontological and epistemological position of the researcher determines how the researcher researches multiple realities (research methodology) in a study (Cohen et al., 2011, p. 33). Paradigms influence the research design of a study, for instance, knowing the kind of questions to be asked, what can be observed and investigated, how to gather data and interpret the research findings (Bertram & Christiansen, 2014, p. 22). It is the choice of paradigm that lays down the intent, motivation and expectations of the research study. In the absence of a paradigm in the preliminary step of the research process, “there will be no basis for subsequent choices regarding methodology, research design or literature” (Mackenzie & Knipe, 2006, p. 2).

It was the research methodology underpinning the paradigm that directed me with knowing the kind of questions to ask, what was to be observed and investigated, how to gather data and interpret the research findings (Bertram & Christiansen, 2014, p. 22). Making explicit the ontological, epistemological and axiological positions of the researcher, can allow for a better understanding of the views and actions of others and can also facilitate new ways of seeing and explaining a phenomenon (Babbie, 2007, p. 32). I now look at the concepts of ontology, epistemology and axiology.

Ontology is the study of being and what is true (Crotty, 1998, p. 10) whilst epistemology is the study of the nature and forms of knowledge (Cohen et al., 2011, p. 7). Ontology shapes beliefs and values, which are socially constructed. These views may not be equally represented - some are underrated whilst others are privileged. Epistemology is how we come to learn of these multiple beliefs. These beliefs are prejudiced by communities of practice, which define what counts as acceptable, thus affecting the relationships between the researcher and the communities that are being researched to such an extent that partnerships are based on power and esteem (Cohen, Manion & Morrison, 2011, p. 33). Axiology is a set of principles that guides conduct in a given situation and is usually informed by codes of practice (Mertens; Robson; Thomas, as cited in Hearne, 2013, p. 2). Axiology is about a theory of values, such as social justice, efficiency and profit that crucially informs what is researched, and why and how it is researched.

Working within an interpretive paradigm allowed me to understand “the world of human experience” (Cohen & Manion, as cited in Mackenzie & Knipe, 2006), as interpretivism is concerned with the meaning-making of subjects in particular contexts. I was concerned with how participants made sense of the phenomenon being studied, namely, the Mathematics curriculum, and how they interpreted it. Through working within the interpretive paradigm, I was able to gaze into the world of the participants and their meaning-making of the phenomenon in this study.

The participants’ experience of how they interpreted, enacted and assessed the official curriculum was the main focus in this study. The researcher had to understand how the learners experienced the curriculum from their perspective and how the facilitators interpreted the curriculum in light of their beliefs and contexts.

3.3 Style

The research study was conducted using the qualitative style as discussed in Chapter One. The qualitative style supports researchers to investigate “domains such as human

behaviour, feelings and thoughts” (Terre Blanche et al., as cited in Rule & John, 2011, p. 60). This allowed me to gain a deeper understanding of the phenomena being investigated.

Qualitative data collected through classroom observations, focus group discussions, semi-structured interviews and document analysis allowed for “depth” and provided rich information to the findings (Burton, Brundett & Jones, 2014, p. 198). The qualitative data described the participants and the learning events in this study. The interpretation of it attempted to offer an explanation of the phenomenon in this study. The qualitative style allowed me to view participants in their context, to see things from their perspective and to feel “their experiences” (Creswell, 2009, p. 8).

3.4 Setting

The setting of the study was an adult centre situated in a peri-urban location in KwaZulu-Natal. The name of the centre and its location has been withheld for the purpose of anonymity as discussed in Chapter One.

The area has a huge school dropout rate and the youth have low levels of education. The centre manager made this comment, “groups of youth are seen loitering around aimlessly from day to day in the area.” In addition, there are high levels of poverty, unemployment and crime. The centre represents a “second chance” for learners who have failed in the mainstream school sector and/or dropped out before completing their schooling.

Having discussed the paradigm and style of the study, I now move on to the approach adopted in the study.

3.5 Approach

The case study approach was used. Yin (2009) defines a case study as an empirical inquiry that investigates a “contemporary phenomenon in depth, within its real-life context” (Yin, 2009, p. 14). This approach allows for researchers to keep the “holistic and meaningful traits of real-life events such as organisational and managerial processes and school performances” (Yin, 2009, p. 4). Rule & John (2011, p. 7) state that the case study approach “facilitates for an examination of a particular instance in great depth”. The context in the study was the adult centre, whilst the unit of analysis was the Mathematics curriculum in its official, enacted and assessed dimensions.

The unique strength of a case study approach is that it has “the ability to manage a diversity of evidence such as document analysis, interviews, observations and artefacts” (Yin, 2009, p. 11). The “how” and “why” questions used during interviews complemented the case study approach (Yin, 2009, p. 10), as this type of questioning attempted to explain present

situations, and this made the case study approach more appropriate to use (Yin, 2009, p. 4).

3.6 Site and Sampling

This study was part of a bigger study (refer to Chapter One). The centre was selected by the principal researcher in the project (Rule, 2015b) using purposive sampling based on certain criteria. Teaching at ABET Level 4 was one of the selection criteria because it is the 'end-point' of the four sub-levels of the ABET qualification (refer to Chapter One on location of the GETC on the NQF). The centre has a relatively good performance record in the General Education and Training Certificate: ABET Level 4 exams. It has been achieving fairly good results over a number of years in the General Education and Training Certificate (GETC), in a systemic context of generally poor exam performance, and has a good reputation among stakeholders such as the provincial Department of Education.

This centre offers both streams in the Mathematics curriculum: Mathematical Literacy (ML) and Mathematics and Mathematical Sciences (MMS). The Mathematics teachers and their learners from both streams were interviewed. Interviews were conducted with the centre manager and the deputy manager. The two streams of Mathematics classes were also observed.

3.7 Data Collection Methods

The data collected permitted me to answer the research questions relevant to this study. The type of data collected was qualitative in nature. It was obtained through semi-structured interviews, focus group discussions, direct observations and written documents, including sources of programme records and responses on questionnaires (Patton, 1990, p. 7).

This study used one-on-one interviews with the centre manager, deputy centre manager, MMS Facilitator and the ML facilitator. Focus group discussions were conducted with the learners in both Mathematics streams. Two Mathematics classes were observed.

3.7.1 Interviews

Interviewing is an important form of data collection in qualitative research (De Vos et al., 2011, p. 342). This method of data collection is flexible and facilitates the use of "multi-sensory channels, verbal, non-verbal, spoken and heard" (Cohen et al., 2011, p. 409). Merriam, a researcher in the field of adult education, describes the interview method as being one of the most appropriate means of answering questions on adult education. She is of the opinion that interviews are both powerful and effective when learning about "people's feelings, opinions, perspectives and personal experiences" (cited in Roulston,

2010, p. 177). Interviews are negotiated texts – a space where “power, gender, race and class intersect” (Denzin & Lincoln, 2008, p. 47). In this study, marginalised groups of people were interviewed. As a qualitative researcher, I was constantly aware of my subjectivity.

The centre manager’s interview (See Appendix 1: interview schedule for centre manager) focused on four aspects, namely: biographical details, teaching and learning, curriculum offerings and teacher qualifications. The same interview schedule was used for the deputy centre manager and the Mathematics teachers. Interviews were semi-structured and questions were specific, which resulted in a flowing conversational dialogue. The questions were structured in such a way that participants were encouraged to speak freely and uninterruptedly, therefore covering many of the questions that appeared in the schedule. Participants felt comfortable in using their own words to describe and discuss their experiences. Four interviews were conducted and held on separate afternoons. Each interview was approximately an hour in duration.

The Mathematics teachers in both Mathematics streams (Mathematical Sciences and Mathematical Literacy) were interviewed. To create a flow in data collection and the analysis of it, I arranged for the teacher interviews, lesson observations and focus group discussions to be held on the same afternoon. The data collection from the Mathematical Sciences stream and the Mathematical Literacy stream was conducted on two different afternoons.

3.7.2 Observations

Classroom observations followed the teacher interviews. The purpose of the classroom observations was for me to understand the participants’ experiences of how they interpreted, enacted and assessed the official curriculum.

Observation is an important method in the empirical process of triangulating “what people say they do and what they actually do” (Conrad & Serlin, 2006, p. 380). Observing in a social context is an important way of “gathering information about the social world” (Denzin & Lincoln, 2008, p. 48). I designed a classroom observation schedule (See Appendix 3: Observation schedule: Adult Learning Centre) that assisted me in what to look out for. The classroom observations were semi-structured. This means that there was an observation schedule that was planned in advance. Although it was pre-planned, it still accommodated the recording of events that featured during observations which were not initially in the schedule. The observation schedule prepared me to record events that I thought of before going in to the classroom and also allowed for spontaneity. Its flexibility allowed for me to add to the schedule events that I had not thought about (See Appendix 3: Observation schedule).

An observational protocol as a method of recording notes in the classroom was designed for the purposes of lesson observations (Refer to Appendix 3). The observational protocol included both descriptive and reflective notes, that is, notes about my experiences in the classroom (Creswell, 2009, p. 125). I recorded the description of events observed, as well as reflective notes about emerging codes, themes and concerns that had arisen during the observation (Creswell, 2012, p. 178). Field notes were collated and these included notes on the teacher's presentation of the lesson, interactions amongst the participants, their body language, the general class environment, the attitudes and participation of participants, formative assessment, the use of resources, Mathematics content, and the presentation of the lesson.

The items (as per Appendix 3) observed in the classroom were categorised, namely: lesson plan, introduction to lesson, lesson purpose and outcomes, materials/teaching aids/equipment, activities, role of the teacher, (lecturer, facilitator, instructor, questioner), methods (lecture, discussion, debate, example, model answer, group work, pair work, individual work, question and answer, role play, simulation game, experiment), role of learner, (active, passive, reader, writer, listener, speaker), assessment, (summative, formative), conclusion of lesson and overall impression.

In this study, I observed the enactment of two Mathematics lessons. As mentioned in Chapter One, there were two streams in Mathematics and both streams were investigated. The Mathematical Sciences and Mathematical Literacy classes were observed. The lessons in both classes were on common fractions and each was forty-five minutes in duration.

Observation raises issues about the effect of the researcher on those observed, and the positionality of the researcher. The theoretical lens in qualitative research (the ontological and epistemological position of the researcher), as discussed earlier in this chapter, creates an awareness of researcher positionality. I made a concerted effort to be unbiased and free from "personal, cultural, historical prejudices" during my observations (Creswell, 2009, p. 62). When writing up my findings, I was aware that this was a marginalised group that I observed in terms of their low levels of education (Creswell, 2009). I was also conscious of the Hawthorne Effect and my positionality as a researcher in this setting, as observation is a special skill that requires management of issues such as "deception of participants and the potential marginality of the researcher in a strange setting" (Creswell, 2009, p.125).

Focus group discussions followed the lesson observation.

3.7.3 Focus Group Discussions

A focus group discussion is a qualitative data collection method. The main advantage of focus group discussions is that they produce a large amount of data over a short period of time. Furthermore, they are effective in accessing a broad range of views on a specific topic, as opposed to achieving group consensus. In this study, the focus group participants were assured that everything they shared in the group would be treated as confidential, though the same cannot be assumed by other members of the focus group. It was, therefore, imperative to emphasise both at the beginning and at the end of the session that participants should respect each other's privacy and anonymity. Once outside of the classroom, focus group participants should not reveal the identities of other participants nor divulge specific comments made during the discussion (Mack, Woodsong, MacQueen, Guest, & Namey, 2005, p. 53).

The learners' focus group discussion was approximately sixty minutes long.

Focus group discussions were held with sixteen learners in the Mathematical Sciences stream and twelve learners from the Mathematical Literacy stream.

Learners were invited to join in the focus group after the classroom observation was completed. Learners were informed that if they wished to leave and not participate in the focus group, they may do so. All learners were keen to participate in the focus group. All of the sixteen learners that were present in the Mathematical Science classroom participated voluntarily in the focus group. Letters of consent were handed out to all learners' present. Informed consent is "a tool for ensuring that people understand what it means to participate in a particular research study so they can decide in a conscious, deliberate manner whether to be a participant or not" (Mack et al., 2005, p. 9). The ethical issues were explained: their right to withdraw at any time from the focus group should they wish to do so, ground rules such as respect, confidentiality, turn-taking and freedom to participate fully (Mack et al., 2005).

The focus group question schedule was pre-planned (see Appendix 4: Focus group schedule: Learners). The learners were encouraged to answer in their mother tongue, although my first language is English. A few learners answered in their mother tongue and this was immediately translated into English by fellow learners. When learners experienced difficulties in verbalising answers to certain questions, we suggested "paired discussions."

The questions that they discussed in pairs were, "How is being a learner at this centre different from being a learner at school?" and "How do you think the centre can improve?" The discussion in pairs was suggested to encourage and stimulate the focus group process.

This intervention assisted the learners greatly, as they spoke with confidence and were stimulated to participate.

Gesticulations as in prompts and words of encouragement from the researcher, such as, “I find that interesting. Tell me more, “Take a few minutes to discuss this with your friend”, were used to elicit rich responses from participants. Paraphrasing was often used in order to enrich meaning by “stating the participants’ response using different words” (De Vos et al., 2011, p. 345). Paraphrasing was used continuously, before moving on to the next question on the schedule.

There were two participants that were reserved and listened attentively and demonstrated understanding of the focus group questions through the use of body language as in the nodding of heads. During the focus group discussions, the question on resources provoked a response from them. They were shy to speak out loud. Instead they whispered their response to the learner seated behind them, who then repeated out loud that “the centre has not enough resources and it is difficult to study with shared resources as in computers.”

Focus groups were audio recorded with prior permission from the participants (Cohen et al., 2000, p. 397). Voice recordings were uploaded to the laptop computer. Audio recording the interviews assured the researcher that “everything said” was captured. The recorded interviews were immediately transcribed after each session so that the raw data was available for analysis.

Table 7 below shows the links between research questions, the sources of data and the methods of data collection

Table 7. Linking research questions with sources and methods

Questions	Sources of information	Methods of data collection
1. What is the official Mathematics Level 4 curriculum used at the centre?	Curriculum documents Teachers	Document analysis Interviews
2. How is this curriculum enacted?	Classroom Teachers Learners	Observation Interviews Focus groups Document analysis
3. How is the curriculum assessed?	Classroom Teachers Learners Classroom documents: teacher files; learner portfolios.	Observation Interviews Focus groups Document analysis
4. How do these three spheres of curriculum impact on Level 4 Mathematics teaching and learning at the centre?	All of the above	All of the above

3.7.4 Documents

Document analysis is a systematic procedure for reviewing documents. Similar to other analytical methods in qualitative research, “document analysis requires that data be examined and interpreted in order to elicit meaning, gain understanding, and develop empirical knowledge” (Corbin & Strauss, 2008). The documents analysed in this study were the teachers’ lesson plans, unit standards, teachers’ Mathematics schedules, the learners’ portfolios and the learners’ exercise books.

The study investigated the relationship amongst the three dimensions of curriculum. In using document analysis, I was able to validate if the centre implemented what the official curriculum says. The teachers’ lesson plans, Mathematics schedules, Portfolio of Evidence and learners exercise books provided information on whether the official curriculum was adhered to. Documents were analysed based on the three themes that emerged from the conceptual framework: the three themes were the enacted, official and assessed curriculum.

Table 8 below provides a summary of when the data were collected.

Table 8. Summary of data collection process

Sources	Centre manager	Deputy centre manager	MMS Teacher	ML Teacher
Interviews	28/08/14	29/01/15	17/02/15	12/02/14
Lesson observations	-----	-----	17/02/15	12/02/14
Focus group discussions (learners)	-----	-----	17/02/15	12/02/14
Document Analysis	-----	29/01/15	17/02/15 16/09/15	12/02/14

Table 9 summarises the sources and data collection methods.

Table 9. Sources and methods for data collection

Sources	Methods
Learners from Mathematical Sciences	Focus group discussions
Learners from Mathematical Literacy	Focus group discussions
Facilitator for Mathematical Sciences	Semi-structured interview
Facilitator for Mathematical Literacy	Semi-structured interview
Centre manager	Semi-structured interview
Deputy centre manager	Semi structured interview
Learners from both learning streams	Focus group discussions
Official documents on curriculum	Document analysis
School based tasks	Document analysis
Learners' portfolio' of evidence	Document analysis
Text books	Document analysis
Teaching of Mathematical Literacy learners	Classroom observation
Teaching of Mathematical Sciences learners	Classroom observation

3.8 Data Analysis

Analysing and interpreting the data is referred to as data analysis (McMillan & Schumacher, 1993, p. 486). My objective in this step of the research process was to make sense and meaning of the data collected. I tried to make sense of “the situation through the eyes of the participant” (Cohen et al., 2011, p. 293). The purpose of this research was to understand and describe how the participants made sense of the phenomenon being studied, namely, the Mathematics curriculum, and how they interpreted it.

Initially, I listened to the recorded data collected, after each collection. This assisted me in familiarising myself with the data and getting me to think about the similar words and common phrases that were presented. After the completion of data collection, I listened to all the interviews on the voice recorder several times before attempting to write the transcripts. Transcripts were verified for accuracy against the tape recording.

Data analysis takes place after the data collected has been “prepared, checked and cleaned” (Rule & John, 2011, p. 77). Qualitative data analysis involves coding the data, dividing the text into small units (phrases, sentences), assigning a label to each unit, and then grouping the codes into themes (Creswell, 2012, p. 208).

I derived the coding label using the words of the participants. I looked for particular themes in the data which related to the research purpose and questions, but was open to other themes that presented themselves in the process. Working both deductively and inductively, I initially used the broad themes derived from the research questions of official, experienced/enacted and assessed curriculum, but also derived sub-categories within each of these themes from the data collected. The themes official, enacted and assessed curriculum were derived deductively, and within the theme of the “assessed curriculum” the sub-categories were the “washback effect” and “teaching for assessment.”

An example of a theme that presented itself inductively was facilitators, and the sub-categories were “hard-working”, “caring” and “patience”. “Culture” was another theme, and its sub-categories were “respect” and “attitude.” These themes and categories were achieved through content analysis, where “many words of texts are classified into much fewer categories” (Weber, 1990 cited in Cohen et al., 2000, p. 559). In qualitative research content analysis focuses on meaning (Rule & John, 2011, p. 25), and this guided my identification of themes.

3.9 Limitations in this study

The limitations of a single case study are that it cannot be generalised to other cases (Rule & John, 2011). The findings are specifically for this case, but may provide some insightful

information which may apply to other similar cases. Another limitation is to assume that these classes represent the centre as a whole. I attempted to address this limitation by gathering data from multiple sources and by using multiple methods of data collection, rather than relying on only one source and method. I was therefore able to triangulate data in developing this rich case study.

3.10 Ethical Issues

Research studies have a prescribed code of ethics to adhere to. In conducting the research, the following ethical considerations (Cohen & Manion, 2000) were taken into account: informed consent was obtained from participants; full disclosure was made by the researcher on the purpose and duration of the study; and participants were assured of their confidentiality and anonymity. Participants were informed that participation was voluntary, and of their rights to withdraw at any time during the study.

Signed consent forms were obtained from all participants prior to data collection. The signed consent form protects and respects the right to self-determination. It also places some of the responsibility on the participant should anything go wrong during the research process. Another aspect of the right to self-determination is that it allows the participant the right to refuse or take part or withdraw at any given time (Reynolds, as cited in Cohen et al., 2011, p. 103).

My data collection involved people with low levels of education. Research pertaining to this group of persons requires special consideration, and additional steps were taken to ensure the research process was ethical. This is because the status or abilities of such persons may limit their levels of self-determination and expose them to exploitation (Rule & John, 2011, p. 113). Hence, signed consent forms were obtained from all persons participating in the research. I explained to the participants clearly the objectives and the thinking underlying the research study.

The confidentiality, privacy and the interests of participants were protected. Participants were assured of anonymity and confidentiality. The anonymity of participants and the adult centre was respected through the use of pseudonyms (refer to Chapter One).

Permission to conduct the research was applied for and obtained from the Department of Education, and ethical approval was obtained from the Humanities and Social Sciences Research Ethics Committee of the University of KwaZulu-Natal (See Appendix 5).

3.11 Trustworthiness and Triangulation

Trustworthiness is a strategy used in qualitative research styles (Guba & Lincoln, as cited in Bertram & Christiansen, 2014, p. 188). Values such as “scholarly rigour, transparency and professional ethics to gain levels of trust in the research community” are described through strategies of trustworthiness (Rule & John, 2011, p. 107). To ensure that the research study was trustworthy, I adhered to the principles of trustworthiness by using interviews and field notes to check if what I observed was linked to what occurred in the interviews.

Reliability was ensured through the use of quantitative data – should this process be repeated by someone else using the same data, the same results should be achieved.

I made constant use of paraphrasing, affirming what the interviewee had actually said. Paraphrasing of responses and listening to the recorded interviews verified what actually transpired. Authenticity was ensured by quoting participants’ voices in the text. As discussed above, all interviewee schedules were prepared in advance, to ensure that the study investigated what it intended to.

Triangulation is a process of using multiple sources and methods to support findings generated in a case study. Triangulation refers to collecting data from a number of different sources (Bertram & Christiansen, 2014, p. 188). This process is suggested by researchers doing qualitative case study research as a way of achieving high quality, rigorous and respectable research. Fundamentally, the logic underlying the concept of triangulation is that the “multiplicity of sources, methods and other aspects of a study would strengthen the truthfulness” (Rule & John, 2011, p. 109). In this study, as part of triangulation, the following data sources were cross-checked, namely: the unit standards in the official curriculum, the teachers’ plans of work, lesson plans, interviews, field and observational notes, site based assessment tasks, teacher schedules, learners’ class exercise books and their portfolios of evidence.

3.12 Researcher Positionality

I was always consciously alert to my “position in relation to the study context and participants” (Rule & John, 2011, p. 113). My own position as a researcher might have affected this study. Therefore, the following precautions were taken, namely: I took into consideration the power dynamics and their impact on data generated in this study. I was aware of the possible ethical dilemmas that I could be confronted with, as a researcher. I was alert to all aspects of my identity which related in any way to diversity. I was aware that my “status as a researcher and authority may influence the data collected” (Rule & John,

2011, p. 113). I was aware that my own ontological and epistemological assumptions may have caused prejudices, as I have many years of teaching experience.

By acknowledging all of the above, I minimised the effect of power relationships on participants. Power relations if not acknowledged can result in participants being afraid and not being able to participate freely. Therefore, I was sensitive to status and power relationships and the impact they may have had on the study. I therefore adhered strictly to the code of ethical practices in the study. Consent forms were signed by all participants in order to respect autonomy; participants were informed that they had the right to withdraw at any time; the researcher revealed her identity; the purpose of the research was explained and the participants were assured of anonymity and confidentiality. The anonymity of participants and the adult centre was respected using pseudonyms.

3.13 Conclusion

This chapter outlined the research design and methodology designed to answer the research questions presented. This mixed methods case study was a part of a bigger case study implemented nationally in four provinces in South Africa. Using the case study approach, I adopted multiple methods of gathering data. Data collection included interviews, focus group and semi-structured interviews, focus groups, document analysis, and lesson observations. Data analysis techniques and processes were discussed. Finally, the ethical issues and confidentiality aspects were fully explained to all participants.

Chapter Four presents the findings of the research and the interpretation and analysis of the qualitative data collected.

4. CHAPTER FOUR: FINDINGS

4.1 Introduction

Chapter Three presented details of how the data were collected, and the methodology used was explained. The case study approach was best suited for this study. As discussed in Chapter Three, Yin (2009) states that in a case study the focus is on “contemporary phenomena within a real-life context.” This definition resonates well in this study as the “contemporary phenomenon” was the ABET Level 4 Mathematics and Mathematical Literacy curriculum in its three dimensions, and the “real-life context” was the adult learning centre. The focus in the study was the relationship amongst the three dimensions of the curriculum: the enacted, official and the assessed curriculum.

Chapter Four presents the data analysis. The data collected were relevant to answering the key research question in the study as discussed in Chapter One – What are the relationships amongst the official, enacted and assessed dimensions of the Mathematics curriculum at the centre? In this section, I examine some of the themes that emerged from the data (refer to chapter Three: Table 9: Sources of data collection). How the learners experienced the enacted curriculum is discussed under themes that emerged from the data analysis in section 4.5.

Throughout this chapter the terms “teacher” and “facilitator” are used interchangeably, as are “students” and “learners”, since the terminology was part of the previous dispensation. In the new dispensation, “teachers” are now referred to as “facilitators” or “educators” and “students” as “learners.” I have also noted that a few articles on education still refer to “students” and “teachers.”

4.2 Thematic analysis

Case studies often adopt a thematic approach to organising and presenting data. In this study, the adult centre is the learning organisation, the staff and learners were the participants, and teaching and learning of Mathematics were the particular aspects of the case. Using the case study approach allowed me to describe each of these elements and examine how they shaped each other within the organisation, based on the themes derived from the research questions and data.

Data collection occurs before data analysis. De Vos (2011, p. 249) posits that the objective of data analysis is to “reduce data in an intelligible and interpretable form to study the research problem.” In doing so, themes emerge at the end of data reduction. Data were analysed and interpreted, as proposed by Rule and John (2011, p. 11) who suggest that

the role of the researcher is to describe and “interpret the case.” It is at this point that I reverted to Chapter One to review the research questions in order to “interpret the case.” As discussed in Chapter Three, content analysis was used as the analytical strategy.

This strategy involved the “coding of data, dividing the text into small units (phrases, sentences), assigning a label to each unit, and then grouping the codes into themes” (Creswell, 2012, p. 208). For example, content analysis involved my reading of transcripts, highlighting of similar words, phrases and ideas used in the text and thereafter assigning labels. The themes that emerged inductively from the learners’ focus groups were: ‘Respect’, ‘Passion’, ‘Hard-working teachers’ and ‘Patience’. In addition, several themes emerged from observation of lessons and interviews with teachers. These included: ‘Teacher-centred lessons’, ‘Teaching of fractions’ and ‘Teacher beliefs’. These themes emerged from the data collected and not prior to data collection (Patton, 1990, p.150).

Codes that presented themselves deductively, before data analysis, were ‘official curriculum’, ‘enacted curriculum’ and ‘assessed curriculum’. These codes were derived from the conceptual framework (Rule & John, 2011, p.77).

I now look at the themes that emerged from the data analysis. The themes discussed in this chapter are: official, enacted and assessed curriculum. Patience and passion of teachers, maturity of learners, learner attitude and respect were derived from the experienced curriculum which is an aspect of the enacted curriculum. The themes derived from the enacted curriculum were teacher styles, teaching of fractions and teacher beliefs.

4.3 The official ABET GETC Level 4 Mathematics Curriculum

The ABET centre in this study was provided with a syllabus (unit standards) and school based assessment tasks by the Department of Education. These documents made up the official curriculum.

ABET Mathematics facilitators, the task team and level heads planned the Mathematics content by referring to the unit standards (refer to the GETC ABET framework: Table 2 in Chapter One, p. 18) in conjunction with the Mathematics unit standards in Tables 10 & 11 in Chapter Four, p. 4.

The official curriculum for ABET Level 4 offers Mathematics in two streams. Learners had a choice between Mathematical Literacy or Mathematics and Mathematical Sciences. Mathematical Literacy is a new learning area and was introduced into the curriculum in 2006, as discussed in Chapter One.

The Mathematics unit standards (US) in the official curriculum for both streams follow: -

Table 10. Unit standards in Mathematical Literacy

SAQA US ID	US TITLE	CREDITS
119373	Describe and represent objects in terms of shape, space and measurement	5
119364	Evaluate and solve data handling and probability problems within given contexts	5
119362	Work with numbers, operations with numbers and relationships between numbers	4
119368	Describe, interpret and represent mathematical patterns, functions and algebra in different contexts	6
	Total	16

Note. Reprinted from SAQA. 71751. Retrieved February 21, 2014 from <http://regqs.saqa.org.za/showQualification.php?id=71751>

Table 11. Unit standards for Mathematical Sciences

SAQA US ID	US TITLE		CREDITS
7448	Work with patterns in various contexts		4
7452	Describe, represent and interpret mathematical models in different context		6
7453	Use algebraic notation, conventions and terminology to solve problems.		2
7464	Analyse cultural products and processes as representations of shape, space and time		2
	Total		14

Note. Reprinted from SAQA.71751. Retrieved February 21, 2014 from <http://regqs.saqa.org.za/showQualification.php?id=71751>

The range of the unit standard 7448 (MMS) 'Work with patterns in various contexts' is shown in Table 12 below.

Table 12. SAQA US ID 7448: Work with patterns in various contexts

DESCRIPTION	CLARIFICATION
Range for Unit Standard: numeric (limited to integers and fractions) and geometric shapes.	
SO 1: Recognise, identify and describe patterns in various contexts.	Describe patterns
AC1: Patterns recognised in terms of relationships between elements of the pattern	Classify patterns as increasing or decreasing e.g. Increasing pattern: 2;4;6;8 Decreasing pattern: $\frac{1}{2}$; $\frac{1}{4}$; $\frac{1}{8}$
AC2: Patterns identified in terms of relationship between elements of the pattern.	
AC3: Patterns described in terms of relationship between elements of pattern.	Use appropriate language to describe patterns/relationship (terms, twice, multiply, add, subtract, etc.) e.g. Finding the common difference 3;6;9; ...
AC4: Appropriate language of comparison and describes relationships between elements of pattern.	

Note. Reprinted from SAQA 71751. Retrieved February 21, 2014 from <http://regqs.saqa.org.za/showQualification.php?id=71751>

The lessons observed for this study were based on unit standard 7448 (MMS) and unit standard 119368 (ML). The name of the unit standard 7448 in the Mathematics and Mathematical Science curriculum is: Work with patterns in various contexts (refer to Table 12). Mathematics and the name of the unit standard 119368: in the Mathematical Literacy curriculum is: Describe, interpret and represent mathematical patterns, functions and algebra in different contexts.

There are four unit standards in each Mathematics stream. The unit standards (official curriculum) are analysed by the task team of the centre into lesson topics and curriculum outlines. The task team is made up of facilitators with some experience. Their experience is significant for the planning and integration of topics. Mathematics facilitators refer to these plans when preparing class lessons. There were no official textbooks or content syllabus for GETC: ABET level 4. As discussed in Chapter One, Level 4 is equivalent to Grade 9. Therefore, facilitators were dependent on the Grade 9 Mathematics textbook as a resource for class activities.

Documentary analysis consisted of the analysis of the learners' portfolio of evidence, the unit standard titles, the teachers' lesson plans, learners' exercise books and the

Mathematics schedules. These documents were cross-checked to investigate if the centre was doing what the official curriculum prescribed. The ABET GETC Level 4 official curriculum (unit standards: refer to Table 11 & 12 of this chapter) provided the framework for the teaching and learning of Mathematics at the centre. The Mathematics official policy document contained the SAQA unit standard number, the title of the unit standard, specific outcomes and the range.

A discussion of the enacted curriculum follows.

4.4 Enacted Curriculum

The Mathematics syllabus was compiled by the “task team” of the centre. The role of the task team was to analyse the unit standards using the description and clarification that was in the official curriculum (refer to Table 10 & 11 of this chapter). The task team included “level heads”, teachers with many years of experience and teachers with little or no experience. The centre manager commented, “It is important to have mainstream teachers on the task team as it assists in taking the centre forward.”

The planning, structuring and organisation of the learning programme is illustrated in Figure 10, page 71. A comment made by the centre manager, “this was unique to this centre as internal assessment is taken seriously”.

As discussed in Chapter Three, the approach used in this study was a case study approach with a qualitative style. Data were collected from learners in the enacted curriculum. The analytical strategy used was content analysis. Focus groups held with learners indicated that they have varying levels of education, ranging from Grade 4 to Grade 11. They are mostly unemployed. The themes that emerged from the experienced/enacted curriculum were patience and passion of the teachers, maturity of learners, attitude and respect.

4.5 Patience and Passion of Teachers

In the focus groups, a few of the learners commented that they have a choice of attending the day high school. Their family members would like them to go back to high school, instead of attending “night school.” Learners choose to register at this centre for many reasons. More than one learner commented on the passion and patience that teachers have at this centre. A learner commented:

We are happy with how teachers teach at the centre...It is different because at day shift it seems teachers don't have time and don't explain and give us more information, but here teachers explain more and have time for learners.

Another learner commented:

The difference is day teachers are not passionate about learners. Here teachers repeat and day teachers don't. Here teachers repeat twenty times to one learner. Teacher is happy to repeat. But a day teacher says we going backward and don't like to repeat. The teachers here, have patience like they teaching five-year-olds.

The comments made by the learners may indicate that learners had negative experiences in the learning of Mathematics during their previous schooling, so having teachers that were prepared to repeat and explain was very important to them. Learners' comments indicate that they were frustrated during the Mathematics lessons enacted at day school as teachers did not repeat and explain as the Mathematics teachers at this centre did.

4.6 Maturity of learners

It was not only the teachers' attitudes that had an effect on the experienced/enacted curriculum, but also the maturity of the learners.

Many learners experienced social, financial and personal issues during their earlier years at school. They "dropped out" of school due to these issues. A learner commented, "I wasn't performing well in Matric because there were too many other things to do. Now as an adult I know exactly what I want. This is our second opportunity to get our Matric." Learners commented that "we were young and immature and not knowing what we wanted." Another comment was, "when I was younger I didn't know what I wanted to do, now that I am older I know what I want to do, that is why I am here." The above comments resonate with the andragogical perspectives on adult education, in particular with two of Knowles' (1980) assumptions about adult learners: one being about the transition from dependency to a more self-directing individual, and the second about a change in "time perspective" as individuals mature to evolve from being "subject-centred" to "problem-centred."

4.7 Attitude and Respect

Respect seemed to be an important value for the learners at this centre. The data below suggests that some learners at this centre had low morale and were sensitive to being mocked. A learner commented,

When you give the wrong answers the other learners do not laugh at you. At day school the learners laugh.

Their responses resonate with Illeris' learning model. In the learning model, the incentive dimension provides the mental energy for the learning process to take place. It constitutes

elements of feelings, emotions, motivation and volition (Illeris, 2009, p. 10). This refers to the psychological, biological and social conditions of the learner which are involved in any learning (Illeris, 2009, p.8). It can be said that the learners experienced bad attitudes previously, for example, being laughed at during Mathematics lessons when they gave an incorrect answer.

It can be assumed that the learners are part of a “community of learning,” as they collectively echoed similar values such as respect and care. The camaraderie amongst learners was evident during the lesson observations and focus group discussions. There seemed to be a strong social cohesion amongst the learners. A learner commented,

Here, we correct each other and we don't laugh. We respect each other at the centre. Everyone respects each other here.

Scholars of adult education concur that good adult learning programmes strive to build on the benefits inherent in positive experiences. Simultaneously, programmes negotiate attempts to “minimise negative experiences that adult learners may bring with them” (Fasokun et al., 2008, p. 40 – 41). I argue that the adult learning centre in this study is conducive to “making learners feel cared for and needed” as they are shown respect and patience by the teachers, and in turn show respect for each other. This is important for marginalised learners, as the frustrations and inadequacy that arise from the inability to learn Mathematics may cause the adult learner to feel “stupid” and may result in withdrawal from the learning activity (Fasokun et al., 2008, p. 44).

The learners experienced the enacted curriculum in a positive way as learners chose this centre for the “hard work, passion and positive attitude of the teachers and fellow learners.” Respect from fellow learners and teachers was another theme that was apparent in the data collected.

I now present the enacted lessons of both classes observed.

4.8 Lesson Observation (Mathematics and Mathematical Sciences)

Two lesson observations were conducted in this study, one in each Mathematics stream. An observation schedule was used to collect data (refer to Appendix 3). The lessons observed are discussed using the headings: focus, introduction to lesson, lesson content role of facilitator, role of learners and learning resources.

The lesson observation was held after the teacher interview. The facilitator introduced me to the MMS class as an observer. The facilitator further explained my reasons for observing the lesson. There were sixteen learners present on the day of the observation. The

facilitator chose the topic to teach. I greeted the learners in English and seated myself in the front corner of the class out of the direct view of the learners. I chose to sit in the corner to minimise any distraction that may have been caused by my presence.

4.8.1 Focus

The lesson was on common fractions, with its focus on addition and multiplication of mixed fractions. The teacher demonstrated the operation of addition of mixed fractions, and how to convert a mixed fraction to an improper fraction.

4.8.2 Introduction to Lesson

The date topic 'Common Fractions' and key words were written on the board. The teacher introduced the topic with a discussion of key words (refer to Figure 8). He assisted learners in recapping prior knowledge. The definitions and explanations of different types of fractions written on the chalkboard are found below.

"Improper fraction: is a fraction in which numerator is greater than the denominator"



Figure 8. Text written on chalkboard

Source: Photograph taken in classroom during lesson observation.

4.8.3 Lesson Content

After writing the key words on the chalkboard, Mr Kobus wrote the operation on the chalkboard. I have reproduced the lesson verbatim as per the tape recording.

$$3\frac{1}{4} + 1\frac{1}{2}$$

Mr Kobus (pseudonym) commenced the lesson by giving the rule:

"First step is to converting the mixed fraction and convert to improper fraction. 3 x 4 is 12 + 1 equals 13 so it is

$$\frac{13}{4} + 1 \times 2 \text{ is } 2 + 1 \text{ is } 3 \text{ which is } \frac{3}{2}$$

So, you know it nicely... plus separating two times so you have to add this; before you add you have to find the, what you call a lowest, a lowest common multiple (LCM).

So, lowest common multiple of 4 and 2 is 4.” (He repeats, while writing on the chalkboard) “so lowest common multiple of 4 and 2 is...(pauses)... (waits for chorus response from learners) ... is 4.” (Learners respond collectively, repeating answer “4”.)

So, the LCM is 4. Four goes into 4 is 1 time so 1 multiplied by 13 is 13 so 2 divided by 4, 4 divided by 2 is the 2 so 2 multiplied by 3 is(pauses for learners to chorus answer)6, so it is plus 6 so it is 13 + 6 is equal to 19, so its $\frac{19}{4}$.

So it's a improper fraction. So now you have to convert it to a mixed fraction. So 4 goes into 19, is 4 times remainder is ... (teacher pauses, waiting for chorus answers by learners, learners are quiet so teacher says) ...4 x 4 is 16 so 16 divided by 3, so the remainder is 3 which is $\frac{3}{4}$. (Teacher pauses)... everything is clear, no questions?”

Source: Transcript from voice recording of MMS lesson observation lesson

Mr Kobus illustrated a different example in following a similar pattern to that shown above, where the rule was explained.

We are now going to do a subtraction using a fraction so $1\frac{3}{5} - 3\frac{1}{8}$ so it is a mixed fraction so you have to convert to improper fraction. So we are going learn how to convert it. So, 5 multiplied by 5 plus 5 + 3 is equal to 8 which is $\frac{8}{5}$

The second example was taught in the same way as the first example. After illustrating the second example, Mr. Kobus wrote examples on the chalkboard for learners to complete in class. He walked around the class marking the learners' work. He identified and explained mistakes on a one-to-one basis. The whole lesson was approximately 45 minutes in duration. The introduction and recap of prior knowledge at the beginning of the lesson was approximately five minutes, the teaching of the examples was thirty minutes and the learner activities were about ten minutes.

4.9 Lesson Observation (Mathematical Literacy)

4.9.1 Focus

The lesson was on common fractions with its focus on addition and subtraction of mixed fractions. The teacher demonstrated the operation of addition and subtraction of mixed fractions and how to convert a mixed fraction to an improper fraction.

4.9.2 Introduction to Lesson

The teacher began the lesson by writing the date and topic on the board. There was no recapping of prior knowledge at the beginning of the lesson. The topic was “Adding and Subtracting.” The teacher also wrote the example “example $\frac{1}{4} + \frac{2}{5}$ ” that was taught in the lesson. Other than this, there was no introduction to the lesson.

4.9.3 Lesson Content

Ms. Zama (pseudonym) commenced by saying.

Here’s how you add.

Step 1 we can’t add two fractions with different denominators. The denominator is bottom number. So you need to get a common denominator – both numbers need to match. To do this, you’ll multiply the denominators times each other. The numerators have to change too. They get multiplied by the other term’s denominator

Ms. Zama continued to proceed with the lesson by giving the rules and encouraged chorus answering similar to that in the MMS lesson.

4.10 Role of the Mathematics Facilitators

The facilitators in the two observed lessons fulfilled their roles in very similar fashion. The discussion and illustrations that follow pertain mainly to the MMS lesson, but the analysis applies generally to the ML lesson as well.

From the transcripts presented above, it can be inferred that both lessons were teacher-centred. In adopting a teacher-centred approach, the teacher played many roles. One was the role of expert. In Freire’s discourse (Nshemereirwe, 2016), this approach to teaching and learning is called “banking.” In using the “banking” approach, the teacher is seen as the expert that “deposits” knowledge, and the best learner is the one who can best return these deposits at examination time. This “banking” approach was exemplified when the MMS teacher presented and explained the following example:

“3 x 4 + 1 equals 13 so it is

$\frac{13}{4} + 1 \times 2$ is 2 + 1 is 3 which is $\frac{3}{2}$ ”

The teacher wrote the example on the board and gave the rules. As the teacher demonstrated the example on the chalkboard, the learners watched carefully and many of them were making notes in their exercise books. The learners listened and watched, engrossed. There was no talking to fellow learners and this implied that they respected and admired the teacher as he worked out the example.

The learners were not given an opportunity to explore the answers themselves by working either in pairs or groups. The learners were led by the teacher, giving the impression that the teacher knows everything. As Nshemereirwe (2016) posits, “banking” education presumes that the learners know nothing, and the teacher knows everything, thus not allowing learners to be active participants in the learning process. In this approach, learners are “objects upon which action is taken rather than subjects who can participate, reflect and become” (Nshemereirwe, 2016, p. 1).

A second, related role was that of assessor. The teachers marked and corrected learners’ work, but did not get learners to assess each other’s work. They walked around the classroom whilst the learners were engaged in the class activity. Learners were given examples which were written on the chalkboard. Learners completed this class activity in their exercise books. This indicated that the teachers understood themselves to be the source of knowledge and judgement.

A third role observed, were the teachers viewing themselves as the primary sources of knowledge and as “depositors of valuable information into the empty vessel that is the mind of the ignorant learner” (Freire, 1970, p. 47). This was evident when they explained the rules and process. The teachers further manipulated the learners’ participation in the lesson. This was evident when the teachers gave the answers and then asked leading questions, pausing and waiting for the learners to chorus answer, as illustrated in the data presented below:

So, lowest common multiple of 4 and 2 is 4. (He repeats) So lowest common multiple of 4 and 2 is... (pauses)... (waits for chorus response from learners) ... is 4. (Learners respond collectively, repeating answer “4”).

The teachers did not use “question and answer” techniques. The teachers assumed the role of instructors.

4.11 Role of Learners

The role of the learners in both lesson observations was similar. The learners were attentive, compliant and passive, followed instructions and provided chorus answers. For example, the learners waited for the facilitator to pause: “so 4 goes into 19 4 times, so remainder is” and then the learners chorused an answer when the teacher paused (refer to the transcript of the lesson above). The deliberate pauses made by the teacher, elicited chorus answering from the learners. This was the pattern throughout the lesson. It seemed as if the learners were trained to respond in this manner and they knew what was expected of them.

There was a question raised by a learner after the teacher completed the first illustration. The learner questioned how the final answer $\frac{19}{4}$ was arrived at. The teacher explained as follows:

So, this is called an improper fraction, our numerator is bigger than the denominator. So, we have to convert this one to a mixed fraction. 4 goes into 19 is 4 times. (The teacher uses the “counting on” method to explain) 4, 8, 12, 16, so remainder is 3. (The teacher counts on) ...17, 18, 19,

$4 \times 4 = 16 + 3 = 19$. So, this is the final answer.

The teacher assumed the role of the expert by working out the answer. The teacher explained using the “counting on” method.”

The learners were given examples to work out under direct supervision and the teacher walked around the class. At the end of the lesson, the homework from the previous day was self-marked. Learners had their own notebooks and pens/pencils.

A few of the learners were older than the teacher. Despite this age difference the teacher appeared comfortable and confident throughout the lesson. In this class the learners’ ages ranged from 20 – 50 years old. The learners listened attentively and raised their hands when asking a question.

4.12 Learning Resources

The teaching aids used in these lesson observations were chalk board, chalk, pens and exercise books, and a few learners had calculators. The classroom walls did not have any wall charts. (The classroom is used by “day learners”, as this is a Secondary school.) There were no resources planned for this lesson.

There were also no written resources such as learner textbooks or worksheets. The only textbook in the class was one which the teacher had from the school. The learners had exercise books into which they copied from the board and worked out their answers.

The teacher used the chalkboard and chalk to write the date, the topic of the lesson and the definition of key words, for example: *“a mixed fraction is a fraction which the denominator is greater than the numerator”* (refer to Figure 8). The chalkboard was used to illustrate the example taught and to present the class-based activities for the lesson.

4.13 Assessment in Lessons Observed

Formative assessment was evident in both the lessons observed. Both facilitators corrected learners' work during the class activity, explaining where they went wrong. Individual assistance was administered to learners.

I now look at the similarities in both (ML and MMS) lessons observed.

4.14 Report on Lesson Observations – MMS and ML Streams

4.14.1 Teacher Styles

Both facilitators adopted similar styles of teaching. The Mathematics facilitators for both MMS and ML referred to the Grade 9 Mathematics textbook for classroom activities and examples. “Chalk and talk” were the only teaching resources used in both lessons. Both lessons had evidence of some formative assessment as facilitators administered individual attention to those learners that required additional assistance. There were no teaching materials on hand to teach fractions so as to create conceptual understanding. The lessons were teacher-centred and rule-based, oriented towards developing procedural understanding of the concepts. Learners were engaged in the lessons mainly through “chorus answering.” The only difference between the two lessons was that in the MMS class, the facilitator introduced the lesson by recapping prior knowledge in the lesson introduction, whilst the ML facilitator went straight into teaching the lesson without an introduction or recapping of prior knowledge.

Both lessons observed were teacher-centred and deductive – from rule to example. The role of the learner was to listen and observe the facilitator demonstrating the operation of fractions on the chalkboard. The teacher played the role of expert by giving the learners the steps to work out examples. For example, the teacher commenced the MMS lesson by saying, *“first step, take the mixed fraction and convert to improper fraction.”* With the teacher

acting out the role of expert, I argue that the learners were not given an opportunity to investigate and discover the different solutions for themselves.

4.14.2 Teaching of Fractions

The literature discusses the teaching of fractions using “conceptual knowledge”, since procedural knowledge (knowledge of rules) on its own will not promote the learners’ conceptual understanding of fractions. The enacted curriculum which I observed, was rule based with a focus on procedural knowledge. Mathematics teachers should ask themselves the question when teaching fractions, as to whether they are promoting procedural knowledge or conceptual understanding. Yin (as cited in Mirrai, 2012, p. 92) has observed that learners often display more “procedural understanding than conceptual understanding.” In the lesson observed, the facilitator gave the rules for working with fractions. It is not known whether the learners understood the conceptual terms of fractions, such as denominator, numerator and equivalent fractions.

Kilpatrick et al’s (2001) model, the five strands of “mathematical proficiency” (Figure 4, Chapter Two), is a good schema for teachers of Mathematics to use when planning lessons. Mathematics lessons should aim to develop learners’ **conceptual understanding** of concepts, operation and relations, procedural fluency (executing the procedure with flexibility and accuracy, efficiently and appropriately), strategic competence (the ability to formulate, represent and solve mathematical problems), adaptive reasoning (allowing for logical thinking and reflection) and productive disposition (viewing Mathematics as sensible, useful and worthwhile).

Kilpatrick et al. (2001) posit that the strand of “conceptual understanding” may be demonstrated using concrete materials. Fractions can be represented by diagrams cut into fraction pieces or fraction walls using counters. Learners may represent fractions pictorially and/or represent the operation by referring to the number line as a story. In using these different representations, learners are more likely to use different solution methods. Such variation used in the teaching of fractions allows learners the opportunities to discuss the similarities and differences of the representations. Kilpatrick argues that the teaching of fractions in this way encourages learners to discover the similarities and differences of the representations and how they are connected if the same answer is to be arrived at. These are learner-centred approaches that adult learners would find meaningful and relevant in their daily lives (Kilpatrick et al., 2001).

The literature review (see Chapter Two) discussed the adult learning theory on andragogy. The facilitator’s role in adult teaching and learning is guided by principles. These principles are advocated in “theories by Knowles, Rogers, Brookfield, Cross, Brockett and Merriam”

(Fasokun et al., 2005, p. 40). Learners are curious and active, with individual likes, abilities and needs. They come into classrooms with varying levels of knowledge, life experiences and backgrounds. A key component in “successfully developing their maths is connecting to these backgrounds and experiences” (Brunswick Grade 9 Mathematics Curriculum Guide, 2011).

It can be inferred from the data presented that teachers of Mathematics did not acknowledge the experiences and prior knowledge of their adult learners. for example, in this study, the MMS teacher did a recap of prior knowledge and the ML teacher went straight into explaining the steps of addition.

Adult learners “use the concept of fractions without realising their interactions with the concept” (Burns, as cited in Mirirai, Mutambara & Chagwiza, 2012, p. 90). I argue that teachers connecting the prior knowledge of adult learners in the teaching of fractions as numbers, bears relevance and meaning to their everyday activities; for example, when learners reflect on phrases such as: “you pay half of one half”, “Take two and pay for only one”, “There is a 25 % discount”, “If you buy for R1.50, you pay R1.00.” It is important for the adult learner to know the “fraction as a number, its position on the number line and the equivalent decimal notation. This is relevant in everyday life” (Van Etten & Smit, 2005, p. 52). Should learners fail to realise their informal interactions with fractions in their daily activities, the formal learning of the concept would be irrelevant and abstract (Mirirai et al., 2012, p. 92).

Van Etten and Smit (2005) argue that attention should be given to the “concept of a fraction in a ratio.” Learners can solve many practical problems through the use of a “ratio table.” Learners should know how to create new columns by multiplying a column with a constant or by adding two columns or more as they wish. For example, a car uses eight litres of fuel for every 100 kilometres. How far can one drive with a full tank of 60 litres? An example of this follows:

Table 13. Ratio table of fuel consumption

Number of litres	8	40	20	60
Number of kilometres	100	500	250	750

Note. Reprinted from “Learning material in compliance with the Revised National Curriculum Statement: A dilemma”, by B. Van Etten and K. Smit, 2005, *Pythagoras*, 62, p. 53. Retrieved July 5, 2015 from <http://hdl.handle.net/10019.1/96455>

In the African context, adults embark on lifelong learning for specific reasons, for example, socio-economic, political and psychological, as revealed in studies conducted by Oduaran. Borrowing from Oduaran (cited in Fasokun et al., 2005, p. 38), in his study of roadside mechanics in Nigeria, it was found that adult learners enrolled for programmes as income-generating activities to sustain themselves and their families.

Researchers have noted that many learners have trouble in understanding fractions (Behr, 1992 cited in Mirirai et al., 2012, p. 90). The learners' difficulties in understanding fractions are categorised into two major related groups: the first is the formal teaching strategies used and the second is the informal learning of fractions as a concept (Behr as cited in Mirirai et al., 2012). Behr argues that the "barriers learners confront in understanding fractions are either inherent to the nature of fractions or to the instructional approaches adopted by the teachers" (as cited in Mirirai, et al., 2012, p. 92). In this study, the findings revealed that the teachers adopted an instructional approach to teach fractions. Teacher beliefs may account for teachers adopting an instruction approach to teaching, as discussed in the following paragraph.

4.15 Teacher Beliefs

Similarly, to adult learners, teachers also have their accumulation of teaching experiences and beliefs, as discussed in Chapter Two. Research studies conducted by Taylor (as cited in Beeli-Zimmerman, 2015, p. 23) revealed a relationship between the school lives of adult teachers and their beliefs on adult teaching. Beeli-Zimmerman (2015) posits that teachers will teach how they were taught. In data collected on lesson observations for this study, it may be assumed that the teacher taught the lesson in exactly the way he was taught at school. A comment made by the deputy campus manager, "the DoE does not have workshops to explain how to unpack the unit standards" indicates that there is no support in this aspect. The absence of workshops may have an impact on the enactment of the curriculum, as teachers then rely on their prior knowledge of how they were taught.

Pedagogic content knowledge also shapes the outcome of the enacted curriculum. PCK means pedagogical knowledge related to Mathematics and includes instructional planning knowledge, the knowledge of student learning and curricular knowledge (Schmidt, 2007, cited in Glover, 2014, p. 27). The Mathematics facilitators in this study do not have "teacher qualifications." Both Mathematics facilitators have Matriculation as their highest qualification achieved.

I now look at the assessed curriculum at this centre.

4.16 Assessed Curriculum

The types of assessment that the centre focuses on are “internal” (assessed by the teacher) and “external” (assessed by the Department of Education). “Site based assessment tasks account for 25% of the learners’ overall marks, and 75% is based on the end of year examination.” The pass percentage is 50% in the final examination (DHET, 2009).

Site based assessment tasks consist of 30 activities in the ABET GETC Level 4 qualification. The tasks are contained in a booklet that consists of 6 pages. DHET supplies site based tasks to this ABET centre. Learners are given a week to complete a specific task. The learners completed tasks are marked and filed. The completed tasks make up part of the learners’ portfolio of evidence (PoEs). Prior to learners writing the final external examination the portfolios are collected and sent off to be externally moderated.

Internal assessments are conducted after each unit standard at the centre and are based on past examination question papers. The “exam committee” designed the internal assessments. The centre manager’s comment was:

We take internal assessments very seriously. Papers are set and moderated by the exam committee. We have a photocopier for these purposes. Other centres would wish to be like ours – being able to produce our own exam papers. Learners are prepared thoroughly, so when it comes to the external examinations there are no surprises.

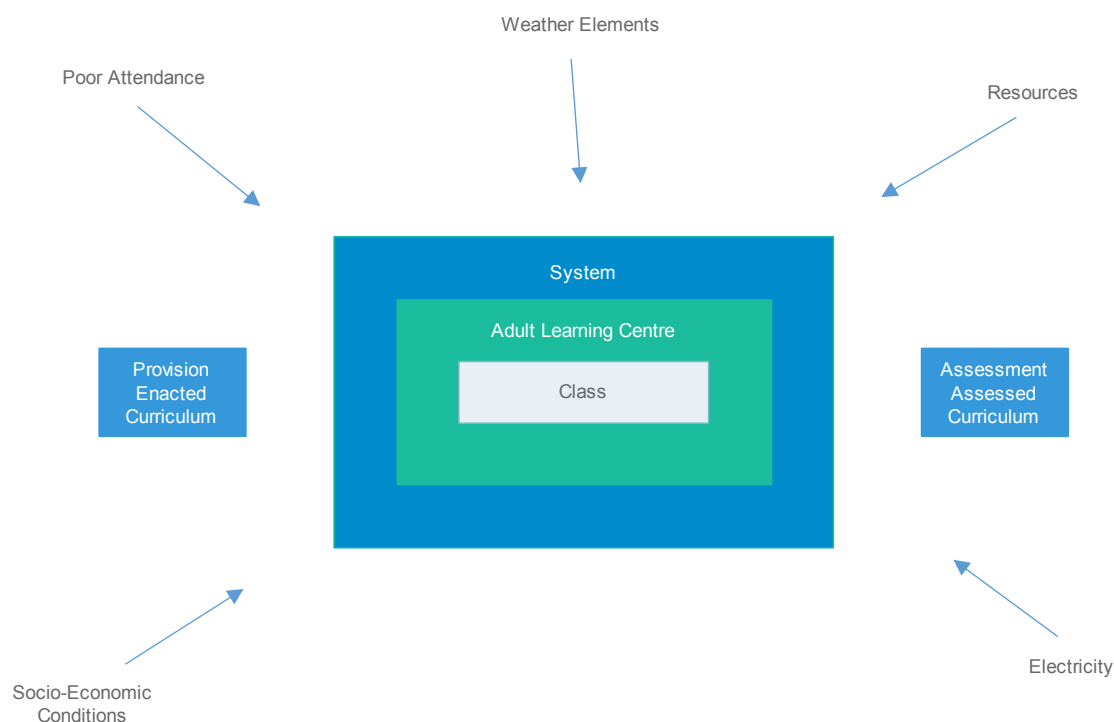


Figure 8. External factors and their impact on teaching and learning at the centre

The class represented in the centre in Figure 8 was the ABET Mathematics class. The adult learning centre forms the second layer. The adult learning centre is responsible for the Mathematics classes in terms of providing the Mathematics curriculum. The system in the outer layer refers to the DoE. The DoE is responsible for providing the official curriculum and the external assessed curriculum (summative assessment) to the centre.

The external challenges that impact on the functionality of the centre are: little or no electricity on most days, the socio-economic circumstances of the learners, poor attendance of the learners, weather elements (particularly in winter) that affect learner attendance and lastly a lack of resources. Regardless of these factors, the Mathematics facilitators commented “we complete the syllabus on time.”

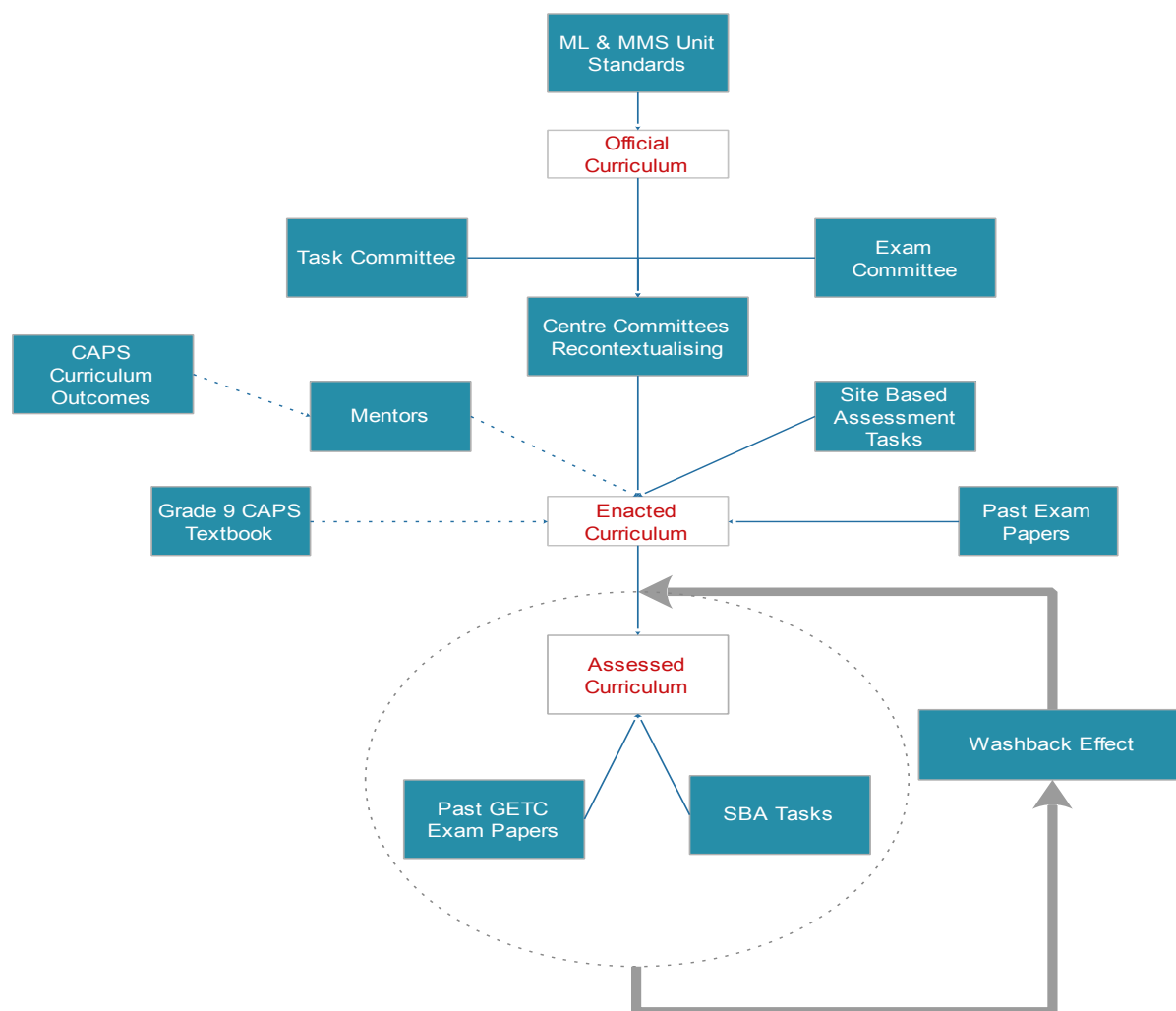


Figure 9. Relationships amongst the three dimensions of the curriculum

The above diagram illustrates a “re-contextualisation” of the official curriculum. The official curriculum was re-contextualised by the exam and task committees by referencing past exam papers and site based assessment tasks to set the internal exams. This was the internal assessed curriculum at the centre. The committees were the “planners” that “develop and plan” the enacted curriculum by working with the unit standards in the official curriculum. The Maths facilitators source the content and activities for the enacted lessons by using the Grade 9 Maths textbook and seeking support from mentors. The MMS facilitator commented,

*I have a friend at another ABET centre and we discuss challenges that we have.
We share resources.*

The relationship between the assessed and the enacted curriculum shows that teachers use examples from past examination papers and site based assessment tasks to enact and assess the curriculum.

The centre “teaches for assessment.” This is the “washback effect” (Rule, 2015a), as discussed in Chapter Two, when the assessed curriculum feeds into the enacted curriculum. The danger of teaching for assessment is that the focus is on assessment and other important areas may be excluded.

4.17 Conclusion

This chapter presented the findings and their analysis, based on the problem statement and the research questions in the study. In this chapter the themes that emerged from the data analysis were discussed in relation to the data collected. The study investigated the relationship amongst the three spheres of the curriculum: official, enacted and assessed.

The Mathematics lessons (the enacted curriculum) were compiled from the official curriculum. Teachers with experience, together with the “new” teachers, were enlisted to “unpack” the unit standards in the official curriculum. Internal assessment was based on past examination papers and SBA tasks provided by the DHET. The emphasis at this centre was on “teaching for assessment.”

The findings revealed that the enacted curriculum was based on the official curriculum as seen in Figures 9, 10 and 11 of this chapter. The unit standards and the specific learning outcomes for the lessons observed appeared in the prescribed official curriculum. Each stream had four unit standards in Mathematics to meet ABET GETC Level 4 qualification requirements.

There was a significant relationship between the three dimensions of the enacted, assessed and official curriculum. The teachers’ lesson plans, teachers’ Mathematics schedules and learners’ exercise books revealed that the teachers were teaching using the unit standards in the official curriculum. The Mathematics schedule consisted of topics sourced from the unit standards and the learners’ exercise books illustrated activities from the teachers’ lesson plans. An aspect of assessment was observed during lesson observations.

The learners interviewed were confident and focused. They had personal goals and they knew what they wanted to achieve through registering at this centre. The learners were motivated and excited about having a “second opportunity” to complete their matric. Learners chose this centre because of the “hard work, passion and patience demonstrated by teachers.” Learners felt “comfortable” in attending the centre, as mutual respect prevailed between learners and teachers.

Professional leadership, shared vision and goals, the learning environment, high expectations, positive reinforcement, monitoring of progress, the frequent use of

assessment, curriculum coverage and planning, accountability, hardworking staff, attendance and punctuality were some of the enabling factors that contributed to the efficacy of the centre.

In Chapter Five, the research questions will be answered and some recommendations for future research provided.

5. CHAPTER FIVE: DISCUSSION AND CONCLUSION

5.1 Introduction

The purpose of this study was to investigate the relations amongst the three dimensions of the curriculum: official, enacted and assessed, in the ABET Level 4 Mathematics curriculum. The objective of this chapter is to present a conclusion to the study.

The case study approach was most suitable for this type of study as it allowed for diverse methods of data collection. The qualitative style enhanced close interactions between the researcher and the participants, accommodating observations of and verbal interactions with participants in their context, that is, the adult learning centre. An important feature of qualitative research is that its methods allowed me to study “selected issues in depth and detail”, thus providing a deep understanding of a situation (Patton, 1990, p. 13).

In this chapter I present a summary of key findings, as discussed in Chapter Four, in relation to the key research questions. Significant findings that emerged from the study are presented in the form of themes, some of which emerged from the conceptual framework of the study, while others arose from the data themselves.

The findings allowed me to answer the research questions during the data analysis. The findings are summarized under the research questions in this section. For the sake of the coherence of my argument, I change the order of my research questions in this chapter. Thus, I begin with: what is the official Mathematics Level 4 curriculum used at the centre? followed by: how is this curriculum enacted and how is it assessed? Answering these questions established the basis for answering my main research question: What are the relationships amongst the official, enacted and assessed dimensions of the Mathematics curriculum at the centre?

5.2 What is the Official Mathematics Level 4 Curriculum used at the Centre?

The centre uses the unit standards that are prescribed in the official curriculum supplied by the Department of Education. There are four unit standards in each Mathematical stream. The exam committee analyses the unit standard topics and the Mathematics teachers refer to this when preparing the content. The findings revealed that the centre is using the Mathematics curriculum that is prescribed in the official curriculum (See Tables 10, 11, 12 in Chapter Two, pp. 59-60).

5.3 How is this Curriculum Enacted?

The lessons observed were teacher-centred and deductive – from rule to example. The role of the learner was to listen and observe the facilitator demonstrating the operation of fractions on the chalkboard. The teacher played the role of expert by giving the learners the steps to work out examples. For example, the teacher commenced the lesson by saying, *“first step, take the mixed fraction and convert to improper fraction.”* With the teacher acting out the role of expert, the learners were not given an opportunity to investigate and discover the different solutions for themselves.

The literature discussed the teaching of fractions using “conceptual knowledge”, since procedural knowledge on its own will not promote the learners’ conceptual procedural knowledge (Kilpatrick et al., 2001, p. 116). The enacted curriculum in this study was rule-based with its focus on procedural knowledge. The learners displayed more procedural understanding than conceptual understanding. The lessons that I observed revealed the facilitator giving the rules for operations using fractions. It is unknown whether the learners have an understanding of the concepts used in the teaching of fractions, for example, denominator, numerator and equivalent fractions.

What and how learners learn is reliant on the teaching strategy. Learners taught fractions by rules (as observed in this study) does not allow them to construct a conceptual foundation for understanding. This type of teaching strategy isolates the classroom concept from the real-life situation and often makes the concept difficult to comprehend (Mirirai et al., 2012, p. 91).

Teachers of Mathematics at the centre did not use practical examples that were related to the lives of adult learners as discussed in Chapter Two in the section: Mathematics and numeracy for adults. The Mathematics lessons that I observed did not demonstrate ways in which adult learners could manage mathematical situations that they might encounter from day to day.

The findings from the lesson observations did not resonate with the wider literature on adult learning. The literature discusses the importance of functionality, relevance, workplace competencies and building a numerate literate citizenry, as per the objectives listed in the Mathematics Literacy official document. The principle of currency, in ABET assessment, implies that the Mathematics curriculum should be relevant to present day learning, but the official ABET Mathematics curriculum has many of its “origins from earlier generations,” it is “less relevant to someone living in the 21st century” (Van Etten & Smit, 2005, p. 52).

5.4 How is the Curriculum Assessed?

The official curriculum was re-contextualised by the examination and task committees by referencing past examination papers and site based assessment tasks to set internal examinations. This prepares the learners for the external examinations. The deputy manager commented, “We are the only centre that has a photocopier to run out exam papers. We prepare learners for the external exams.”

The assessed curriculum draws heavily on external prescriptions of assessment, in the form of the site based assessment tasks and the exams. The centre bases its own assessment on these prescriptions so as to prepare the learners for the final exam.

There was also some evidence of formative assessment in the form of oral questions when the MMS teacher introduced the lesson by recapping key definitions (for example: “*an improper fraction is a fraction in which numerator is greater than the denominator*”) which the teacher used to establish learners’ prior knowledge and understanding, written exercises, and learners answered questions written on the board. The teacher thus demonstrated some understanding of how to use formative assessment to help learners learn. The teacher revised the key terms necessary to teach the concept of common fractions.

However, the formative assessment did not extend learners by asking them to relate examples to the contexts of their own lives. Formative assessment was thus geared towards preparing learners for external, summative assessment. The examples used to teach common fractions were sought from past exam papers and were not meaningful and relevant to the Mathematics/numeracy problems that learners encounter in their daily lives.

5.5 How do these Three Dimensions of Curriculum impact on ABET Level 4 Mathematics Teaching and Learning at the Centre?

Overall, the relationship among the three dimensions of the curriculum showed that the enacted curriculum was compiled from the official curriculum. Teachers with experience, together with inexperienced teachers, analysed the unit standards in the official Mathematics curriculum. Internal assessment was based on past exam papers and SBA tasks provided by the DHET. The emphasis at this centre was “teaching for assessment”.

The findings revealed that the enacted curriculum was based on the official curriculum as seen in Tables 10 and 11 on page 59. The lesson observations in both classes sourced lesson topics from the unit standards in the official curriculum. Each stream had four unit standards in Mathematics to meet the ABET GETC Level 4 qualification requirements. The

Mathematics schedule contained topics based on the unit standards in the official curriculum and the learners' exercise books illustrated activities from the teacher's lesson plans. An aspect of formative assessment was observed during lesson observations.

There was a relationship between the enacted, assessed and official dimensions of the curriculum. The teachers' lesson plans, teachers' Mathematics schedule and learners' exercise books illustrated that the teachers sourced the unit standards from the official curriculum to teach class lessons.

However, the lessons enacted are designed for assessment – teachers were not flexible and creative when enacting lessons, as their focus was on assessment. The examples used to teach Mathematics in both streams were sourced from the site-based assessment tasks and past examination papers. For example, the lessons I observed on fractions related to the unit standards as stated in the official curriculum but were not enriching in the lives of adult learners. I argue that ABET learners do not have the desire to learn how to convert a mixed fraction to a proper fraction. Rather, they desire to learn how to solve everyday problems involving numbers and Mathematics. Further to this, the examples and topics used to teach, contradicted the objectives listed in the ABET Policy document.

5.6 What are the Relationships Between the Three Dimensions of the Official, Enacted and Assessed Mathematics Curriculum at the Centre?

I begin by focusing on the relations between the official and enacted curricula. The official curriculum consisted of unit standards, learning outcomes and policy documents. The Mathematics policy requires that the Mathematics curriculum be a learning area that is driven by “life-related application of Mathematics” (DoE, 2003, p. 9). The aim formulated for Mathematical Literacy in the ABET curriculum, Mathematics and numeracy for adults, identifies several key considerations regarding the Mathematics ABET curriculum: functionality, relevance, workplace competencies and a numerate literate citizenry. One of the principles of assessment in ABET is to be current. Current refers to the relevance of keeping up with present affairs and the life-world of ABET learners (DHET, 2009).

The unit standards in the official curriculum (Tables 10 & 11) prescribe what is to be taught in the Mathematics curriculum at ABET GETC Level 4. The topics in Mathematical Literacy were: describe and represent objects in terms of shape, space and measurement; evaluate and solve data handling and probability problems within given contexts; work with numbers; operations with numbers and relationships between numbers; and describe, interpret and represent mathematical patterns, functions and algebra in different contexts.

The topics in Mathematical Sciences prescribe the following four unit standards: - work with patterns in various contexts; describe, represent and interpret mathematical models in different contexts; use algebraic notation, conventions and terminology to solve problems; analyse cultural products and processes as representations of shape, space and time.

The enacted curriculum in the MMS and ML lessons consisted of working with numbers and the four different operations: addition, subtraction, division and multiplication. This was consistent with the requirements and the official curriculum was met. However, the enacted curriculum diverged from what is stated in the official Mathematics policy document which states that the Mathematics curriculum is a learning area that is driven by “life related application of Mathematics” (DoE, 2003. p. 9).

“Life related application of Mathematics” as discussed in Chapter Two discusses functionality, relevance, workplace competencies and building a numerate literate citizenry. These are listed as objectives in the official Mathematical Literacy policy document. The unit standards prescribed in the official document for adult learners are not relevant to their workplace competencies, nor relevant in preparing adult learners to manage their daily life problems effectively.

Sadly, there is a disconnect between the official and enacted ABET Mathematics curriculum and the objectives in the Mathematical Literacy learning area, introduced in 2006. This results in adult learners not being able to engage and manage the mathematical demands of situations in adulthood as outlined by the PIAAC Numeracy Expert Group (as cited in Bansilal, 2014, pp. 1157 – 1158) and the aims of ML (DoE, 2003).

In addition, the focus of Maths Literacy is on the applicability of Mathematics learners to participate meaningfully in decisions centred in the various contexts they encounter. Learners should learn to “access, use, interpret and communicate mathematical information and ideas, to engage in and manage the mathematical demands of a range of situations in adult life” (DoE, 2003). The learning area in ML was to provide opportunities for learners to become mathematically literate in the social and life sciences disciplines (DoE, 2003). Dismally, the Mathematics curriculum is “fraught with myths, omissions and unwarranted ambitions” (Julie, as cited in Botha, Maree & Stols, 2013, p. 182). Julie highlighted that the “lack of a recreational component and the dilemma of what context ML should be taught in” makes the teaching of ML complex (Botha et al., 2013, p. 182).

From a pedagogical aspect, the teaching and learning of ML was to provide opportunities to engage with Mathematics in diverse contexts at a level that learners can access logically (DoE, as cited in Botha et al., 2013, p. 182). The teachers of Mathematics in both streams

may or may not have the knowledge and skills to teach in content topics in an integrated way. “The absence of precedents of what pedagogy should be like” caused “multifarious interpretations of the curriculum aims” (Graven & Venkat as cited in Botha et al., 2013, p. 182).

Regarding the relationship between the official and enacted dimensions of the curriculum, the teachers of Mathematical Literacy and Mathematical Sciences teach the unit standards as prescribed in the official curriculum. The findings from the enacted curriculum revealed that the teachers use the deductive method in teaching, that is, from rule to example. The examples used were abstract and lacked relevance to adults’ daily life experiences.

A learner commented, “This is our second chance in completing our schooling.” The learners at the centre did not express any desire to further their studies in the Mathematics area, but would prefer to learn about relevant and practical ways of problem-solving. The examples observed in the enacted curriculum did not resonate with the wider literature on adult education and the needs of adults. The findings as discussed (refer to Chapter Four) demonstrated that what was enacted did not bear relevance to the learners solving the practical mathematical issues they meet in everyday life.

Findings revealed that the assessed curriculum dominated the enacted curriculum. The centre “teaches for assessment.” Teaching for assessment is referred to as the “washback effect” (Rule, 2015a), where the assessed curriculum feeds into the enacted curriculum. The danger of teaching for assessment is that the focus is on assessment and other important areas may be excluded or overlooked.

There was a relationship between the official curriculum and the -assessed curriculum. This was clearly noted in the evidence sourced from document analysis: teachers’ schemes of work and the learners’ portfolios of evidence contained the site based assessment tasks provided by the DoE. The internal assessment conducted at the centre is based on past external examination papers set by the DoE.

The relationship between the enacted curriculum and the assessed curriculum was evident in the learners’ exercise books and the lesson observed. The teacher commented, “We use past exam papers to teach.”

5.7 Significance of the Study

As established in my literature review (see Chapter Two), there is very little South African scholarship on curriculum in ABET generally, and on Mathematics. My study contributes some insights into this under-researched area regarding the relationships amongst the

official, enacted and assessed dimensions of the Mathematics ABET curriculum in one centre. In particular, it finds that the teachers used the official curriculum to guide their enacted curriculum, and that external assessment prescriptions strongly informed the enacted curriculum. It also finds that there was not a strong relationship between the enacted curriculum and the learners' everyday lives and interests, which is contrary to recommendations from the international literature on teaching Mathematics to adults as stated in The Qualifications and Curriculum Authority (QCA) which defines functional skills as "practical skills in maths that facilitate individuals to work confidently, effectively and independently in life" (FitzSimons, 2008, p. 8).

5.8 Reflections on Learning from the Study

I share a few of my significant learning points during this research study.

5.8.1 The Research Design

Creswell (2012, p. 20) describes research design as a set of sequential steps. I found myself going back and forth amongst the steps in the research design. For example, I had to revert to the focus, purpose, methodology and the research questions continuously during data collection and analysing. I learnt that having a succinct proposal is beneficial as it facilitates a clear picture of the research process ahead. It was necessary to revert to previous steps during the research study to ensure that the questions were answered logically, that the data collected and the analysing of data were in congruence with the research questions, and that the presentation of the chapters were in harmony. This assisted my writing of the research study in a coherent and effective manner. I learnt that the nature of research is time-consuming and that the crux of research lies in the answering of the questions and the data analysis.

5.8.2 Data Collection

It was important to be flexible, especially during data collection. I learnt that the recording of data using a voice recorder, taking field notes and photographs are invaluable strategies in data collection. This assisted me greatly during data analysis, especially during triangulation and the verification of data. I had to be flexible during focus group discussions. For example, I changed the way the questions were asked to encourage learner participation. I used "prompts" and learners discussed the questions in pairs before they presented their answers. I learnt that the nature of research revolves around the answering of questions and investigating the phenomena in the research study. I learnt about the

relationship between different sources and methods of data collection, and the value this added in making the data credible and in enabling the triangulation of data.

5.8.3 Enjoying the Research Journey

My interest as an adult learner kept me focused during this study, and aroused my curiosity in finding the answers to my research questions. I was interested to find out how the assessed curriculum fed into the enacted curriculum. Despite the learning process being challenging, it was an enjoyable journey that kept me motivated till the end.

5.9 Limitations of the Study

This was only one centre investigated and the findings cannot be generalised to other centres or to the system. The data sources were limited to two classes in the two streams (MMS and MLS) of the ABET GETC Level 4 qualification, and I observed only two lessons, which might not necessarily represent the teaching approach through the whole year. Logistical issues made data collection difficult and somewhat curtailed the extent of the data collected.

5.10 Recommendations for Further Research

The following recommendations are suggested for further research in the field of Mathematics at ABET GETC Level 4.

A mixed methods research study could be conducted on teacher qualifications and the beliefs/knowledge of ABET teachers of Mathematical Literacy and Mathematical Sciences, and how these relate to the mathematical performance of learners in both Mathematics streams. My study did not investigate teacher qualifications and teacher beliefs and their relationship to learner performance. I think a study of this nature would inform us on the effect of teachers' qualifications and its impact on learner performance.

or

A comparative study between two ABET centres, investigating the three dimensions of the curriculum in relation to learner performance, would be fruitful. Given that my study did not focus on learners' actual performance in exams, such a study would bring in a quantitative dimension. This would inform us of the effect of the methodologies used on learner performance.

5.11 Conclusion

The purpose of this research study was to investigate the relationships between the three dimensions of the curriculum: official, enacted and assessed in the ABET Level 4 Mathematics curriculum. The findings revealed that teachers were enacting the curriculum as prescribed in the official curriculum. There is a relationship amongst the three dimensions of curriculum: - the official, enacted and assessed curriculum. A triangulation of the data collected from different sources demonstrated this. Despite this relationship between the enacted curriculum and the official curriculum (based on the unit standards) the examples used to teach learners did not meet the objectives stated in the ABET policy. In addition, the approach used in enacting the curriculum was driven by assessment, thus making the assessment dimension dominant in the curriculum. The study revealed a lack of application of the curriculum to the learners lived experiences. The enacted curriculum in this study was not relevant to adult learners' daily lives and contexts.

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APPENDICES

Appendix 1: Interview Schedule for Centre Manager

Main Research Question

What factors contribute to the effective and efficient functioning of adult education centres with regard to Teaching and learning?

Interview Questions

Centre Manager

Biographical

1. What is your name?
2. What qualifications do you have?
3. Do you mind telling me how old you are?
4. When did you start working at the centre and how long have you been here?
5. How do you understand your role at the centre?
6. Do you do other work outside the centre? If yes, what?

Teaching and learning

1. How many learners are registered at the centre?
2. How many learners are retained through the year?
3. How many pass exams (if they are written)?
4. What is the curriculum? (formal courses offered; livelihood training; other offerings)
5. How many teachers do you have at the centre?
6. Who are the teachers?

Part time	Full time	School Teachers	Volunteers
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7. Training Specialists
8. What are their qualifications?
9. What is the teacher-learner ratio?
10. Describe the levels of motivation and commitment of teachers. What motivates them?
11. What are the main challenges that you face in teaching at the centre?
12. How does the centre respond to these challenges?

13. How do you define successful learning?
14. Do you think your centre is successful? If yes, to what do you attribute this success?
15. What do you do at your centre that makes your centre successful compared to other centres?
16. Could you suggest ways in which we could improve our adult education system generally?

Appendix 2: Interview Schedule for Teachers

Main Research Question

What factors contribute to the effective and efficient functioning of adult education centres with regard to Teaching and learning?

Interview Questions

Teachers

Biographical

1. What is your name?
2. What qualifications do you have?
3. Do you mind telling me how old you are?
4. What subjects are you teaching at the centre?
5. How do you understand your role at the centre?
6. Do you do other work outside the centre? If yes, what?

Experiences of the centre

1. How does teaching adults compare with teaching children?
2. How do you encourage and stimulate your learners to learn?
3. What learning resources and materials do you use in your class?
4. What are main challenges that you face in teaching at the centre?
5. How do you respond to these challenges?
6. How do you define successful learning?
7. How do you decide what to teach?
8. How do you know that the teaching methods you use are effective?
9. How do you decide what to assess?
10. Did you read the curriculum for the levels below and above this learning area? If yes, how did this help you to teach and assess?
11. Do you think your centre is successful? If yes, to what do you attribute this success?

12. What do you do at your centre that makes you centre successful compared to other centres?
13. What role does the community play in the centre?
14. What relations does the centre have with other centres and institutions?
15. Could you suggest ways in which we could improve our adult education system generally?

Appendix 3: Observation Schedule – Adult Learning Centre

Centre Name: _____

Date: _____

Observer Name: _____ Signature: _____

ITEM	OBSERVATION	COMMENT
Location and appearance:		
Describe location – rural, urban, peri-urban; in a school/community hall/church/factory etc.; and what it looks like.		
Number of classrooms		
Number of admin rooms		
Number of staffrooms		
Other facilities (e.g. library, laboratory, computer room etc.)		
State of infrastructure (good, fair, poor – give details)		
Cleanliness and hygiene (toilets, litter, dustbins, ventilation, etc.)		
Learning environment Classroom facilities (chalkboard, white board, OHP, etc.)		

<p>Furniture and arrangement</p> <p>Display space and walls</p> <p>Materials/learning aids/resources</p>		
<p>Accessibility: Special Needs: (wheelchair access, braille, sign language, etc.)</p>		
<p>Other comments</p>		

Appendix 4: Interview Schedule for Learners – Focus Group Discussion

Main Research Question

What factors contribute to the effective and efficient functioning of adult education centres with regard to:

Teaching and learning?

Interview Questions

Learners

Biographical

1. What is your name?
2. Do you mind telling me how old you are?
3. When did you first come to this centre? How long have you been attending classes here?
4. What learning areas are you enrolled for here?
5. How many years of schooling do you have?
6. What is your highest grade?
7. Where do you work, if you do work?

Experience of the centre

1. Why did you start attending classes at this centre?
2. What did you hope to achieve in these classes?
3. Have these expectations been met? If yes, in what ways?
4. What are most important things that you have learnt at the centre?
5. What are the main challenges that you face in learning at the centre?
6. How do you respond to these challenges?
7. What does your family think about you attending classes at this centre?
8. What motivates you to keep coming to the centre?

9. Are you able to use what you learn at the centre in your everyday life, if yes, how?
10. How will having more education help you in your life?
11. Have you ever been to classes at other centres? What makes this one different?
12. What role does the centre play in the community?
13. What are the community's attitudes towards the centre? Please explain.

Appendix 5: Ethical Clearance Certificate



25 August 2016

Mrs Prem Bachan 212558929
School of Education
Pietermaritzburg Campus

Dear Mrs Bachan

Protocol reference number: HSS/1053/015M

Project Title: Efficacy in the numeracy curriculum at a public adult learning centre in KwaZulu-Natal

Full Approval – Expedited Application

In response to your application received 4 August 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

Cc Supervisor: DR peter Rule/Karen Sophie
Cc Academic Leader Research: Dr SB Khoza
Cc School Administrator: Ms Tyzer Khumalo & Ms B Bhengu

Humanities & Social Sciences Research Ethics Committee

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